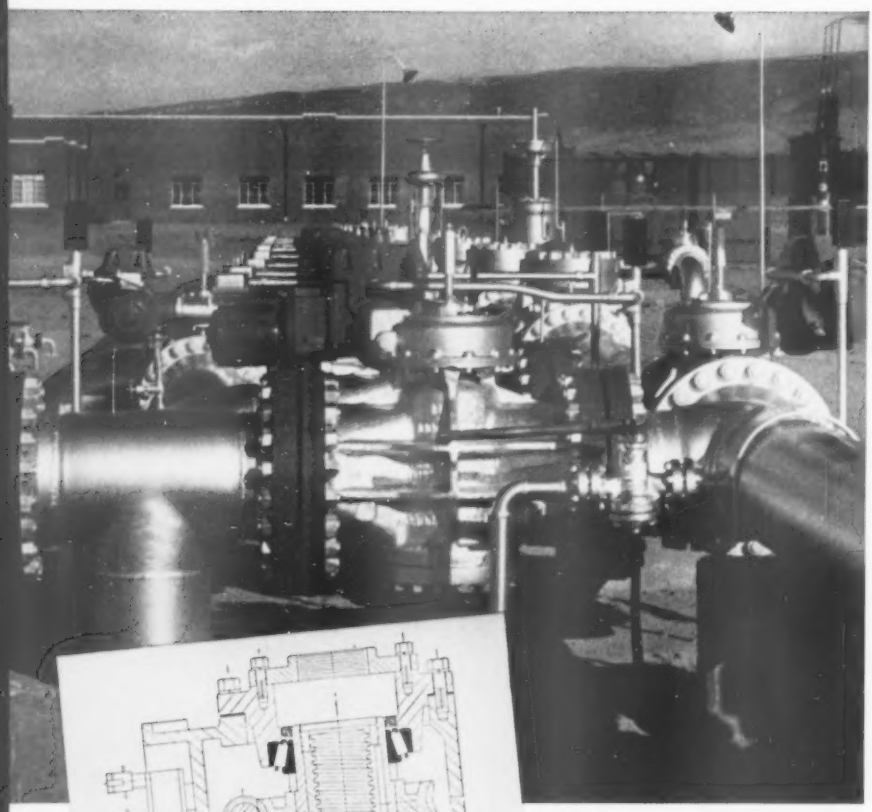
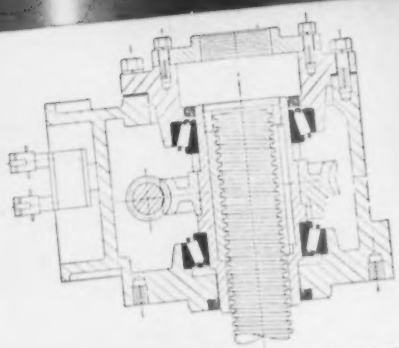
the OIL AND GAS JOURNAL

Keeps pipeline valves out of a jam

...with help of TIMKEN® bearings





How the E. I. M. CO. mounts the stem nut sleeve on Timken tapered roller bearings to assure easy valve operation, long life.

MAKING the large valves used on gas and oil pipelines easy to open and close is the job of E.I.M. Electric Valve Control Units. To prevent costly valve jamming and assure long, dependable service, the stem nut is mounted on Timken® bearings.

Valves open and close easily because Timken bearings have true rolling motion and smooth surface finish which practically eliminate friction. Timken bearings' tapered construction and full line contact enable them to take the heavy thrust load resulting from pipeline pressure.

Your machinery will give you longer, more dependable service with Timken bearings. Be sure to specify them in the oil field equipment you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ↕ AND THRUST →○← LOADS OR ANY COMBINATION ✳

FOR LOW PRESSURE TREES TOO—

There's a Right Nordstrom *Lubricated* Valve

Nordstroms have long been considered the finest valves for high pressure trees. But for low pressures too, the many advantages of Nordstrom design make it the ideal choice.

In fact, for trees of *any* pressure, such features as quickest operation, lubricant sealed closure, longest valve life, and trouble-free operation make Nordstrom superior to any other valve.

Write for *Trees of Steel*, Bulletin V-209, Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania.

ROCKWELL Built Nordstrom Valves

Lubricant-Sealed for Positive Shut-Off

Another Rockwell Product

Wherever you are in the oil fields, you're close to a supply house with Nordstrom valves and Nordstrom service.

the OIL AND GAS JOURNAL

JUNE 29, 1953 VOL. 52 NO. 8

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In Brief . . .

1. PREIGNITION PROBLEM . . . Long a problem in aircraft engines, preignition has recently been found to occur in high-compression-ratio automobile engines, and is at present the factor threatening to limit compression ratios. Many "knock" complaints in recent-model engines are actually the result of preignition. Solution to this problem seems to lie in the addition of small amounts of various chemicals to the fuels to reduce glow of engine deposits, thought to be the prime cause of preignition. Various additives reported by several oil and chemical companies seem to be effective.

•

2. CONTRACT DRILLING . . . Four advantages are derived by an oil company from contracting its drilling work: (1) greater operational flexibility, allowing more and varied work to be performed during any one given period of time; (2) drilling contractors are usually specialists in certain types of drlling, thus providing for maximum work, reduced labor turnover, and lower costs; (3) capital required to buy expensive drilling equipment is saved; and (4) savings are realized on executive, supervisory, and accounting expenses.

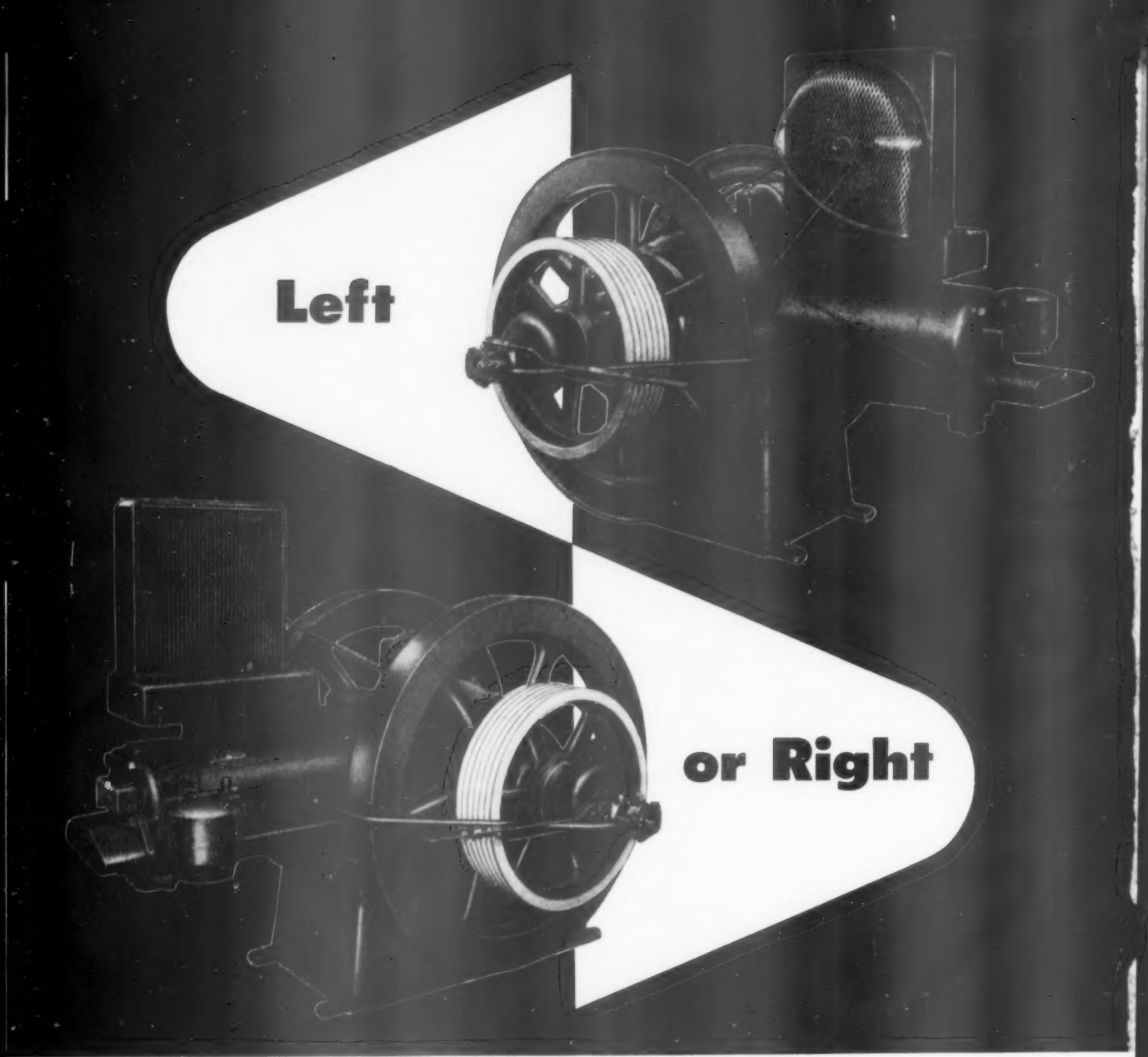
•

3. INCREASED PRODUCTION . . . Hydraulic fracturing may be used for (1) increased drainage area; (2) breaking through permeability blocks at well bore; and (3) breaking through to a permeable oil-saturated zone. Best results are generally obtained when fracturing sandstones or conglomerate formations. Viscous crudes and refined oils are now used as fracturing fluids. Better results are obtained when conducting treatments through perforations in casing.

4. NEW MEXICO COMMITTEE . . . New Mexico Oil and Gas Engineering Committee prepares monthly statistical reports on all oil and gas pools in the state. Reports include oil, water, and gas production; gas-oil ratios; dry-gas production and distribution; distillate production; dual completions; gasoline-plant intake and distribution of gas and products from these plants; and completions of new producing wells.

•

5. PETROLEUM CHEMICALS . . . Derivatives of hydrocarbon compounds which contain oxygen, nitrogen, and halogens are used in one of the most active fields in industrial development. Of particular interest are the vinyl-type monomers used ultimately to make plastics and synthetic rubber. These monomers can be prepared from petroleum in a number of ways.



is right with the "ZC"

With a Fairbanks-Morse "ZC" Engine on your pumping rig, you can mount your clutch and sheave on either the *right* or *left* side of the engine. It's a big convenience feature that makes it easy for you to mount the engine where *you* want it on your pumping jack.

The TWO big flywheels of the "ZC" make this feature possible and give you the important flywheel effect on each side of the engine for smooth operation and economical performance.

The Fairbanks-Morse Type "J" clutch and sheave assembly are ruggedly built units with extra heavy friction plates and contact parts to prevent distortion and assure uniform pressure at all times.

For the complete story on the "ZC" . . . *the engine with the big double wheels,* see your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE,

a name worth remembering

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

6x36 WS PREformed Right Lang Lay
Monarch Whyte Strand with IWRC

What's unusual about this machine?

This is a 6 x 36 PREformed rope, made up of 265 wires. That means 265 individual moving parts.

Because any wire rope is a complicated piece of machinery, it must be precision built.

There are 8 different sizes of wire in this rope — each drawn to exacting specifications for material and size.

Outside wires are one size. Inside wires are another. Core and filler wires are still other sizes.

All wires are cold-drawn to precise diameters so they will fit with snug uniformity into the structure of each strand.

Each wire is protected with lubricant applied during fabrication of the rope.

Macwhyte makes a thousand and one ropes to meet the needs of every type of equipment. Each is built with the exacting care that long, low-cost service demands.

Prompt recommendations from Macwhyte engineers are readily available without obligation.

MACWHYTE WIRE ROPE

THE RIGHT ROPE
FOR YOUR EQUIPMENT

Ask for G-15 Handbook

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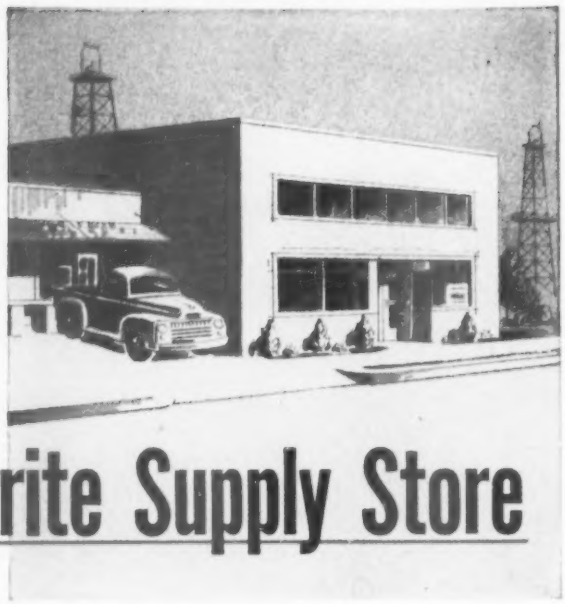
Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies. Mill depots: New York Pittsburgh • Chicago • St. Paul • Fort Worth Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.

1039

Now you can get WITTE ENGINES through your favorite Supply Store



HERE'S GOOD NEWS for oilfield engine users! The complete line of sturdy, heavy-duty slow-speed Witte Engines—in gas-gasoline models from 5 to 15.5 hp and full diesel models from 3.75 to 12.5 hp — may now be purchased through a number of supply stores in every locality.

Witte Engines are known throughout the oilfields for the outstanding operating and maintenance records they have set in a wide variety of power-unit applications within their performance range. Built on the four-cycle principle, they'll give you long, satisfactory service at the lowest operating costs.

If your power requirements are within the Witte range, it will pay you to ask YOUR Supply store about Witte Engines today.

WITTE ENGINE WORKS
OIL WELL SUPPLY DIVISION
UNITED STATES STEEL CORPORATION
Kansas City 26, Mo.

WITTE ENGINES

USS

Gas-gasoline — Models from 4 to 15.5 hp

Full diesel — Models from 3.75 to 12.5 hp

UNITED STATES STEEL

LINK-BELT Precision Steel Roller Chain Wraps Up and Delivers 700 H.P.

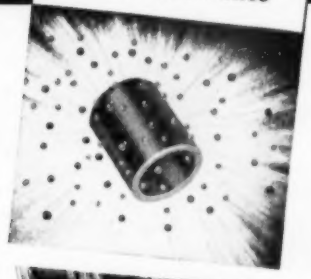
In This Brewster Drawworks

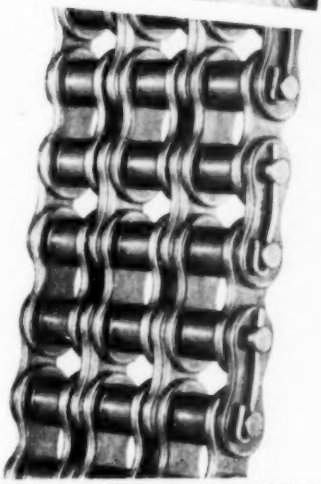
DOUBLE, triple and quadruple width Link-Belt Precision Steel Roller Chain in this compound makes three engines drive as one, delivering 700 h.p. for drilling to 10,000 ft. with 4½" pipe. The transmission is equipped with Link-Belt Roller Chain drives and provides four forward and two reverse speeds.

Link-Belt Precision Steel Roller Chain is the oilfield choice for heavy-duty service. Link-Belt Rollers are shot peened, a process which gives them extra fatigue life and added ability to withstand shock and impact. The patented Link-Belt E-Z Assembly feature permits easy coupling and uncoupling right on the job. And Link-Belt precision-controlled heat treating guarantees absolute uniformity of all parts.

There is a Link-Belt Precision Steel Roller Chain to fit your need. Call the nearest Link-Belt engineer to give you all the facts.

Shot peened rollers mean extra life, extra performance





LINK-BELT

PRECISION STEEL ROLLER CHAIN

LINK-BELT COMPANY: Indianapolis 6, Dallas 1, Houston 1, Los Angeles 33, Kansas City 8, Mo., New York 7, Toronto 8.

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PESA
PARTNERS IN PETROLEUM PROGRESS

5 x 6½

GAS and OIL ENGINES

Yes, sir—this baby is an **AJAX** through and through, giving you the same rugged dependability in the 5 to 12 horsepower range that you naturally expect of its bigger brothers. Compact, simple, easily accessible, the Ajax Model WL 5" x 6½" Gas Engine provides faultless performance for your lighter pumping loads with remarkable operating economy.

• Ask for Bulletin 512—and see your Supply Man!

AJAX IRON WORKS

Builders of Gas Engines • Steam Drilling Engines • Industrial Steam Engines

CORRY, PENNSYLVANIA

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R. B. MOORE SUPPLY CO., BOLIVAR, N.Y. • BETHLEHEM SUPPLY CO., TULSA, OKLA.

Mister . . . this proves it . . . a better Wire Rope has been built!

J&L SPRINGKORE
a new type drilling line

Here's what it gives You

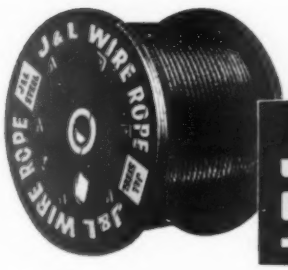
1. **Greater flexibility**
2. **Greater resistance to crushing**
3. **Economy**

Your First order will prove it

Here's why J&L SPRINGKORE does a better job for you

J&L SpringKore Drilling Lines are just what the name implies —a new type of wire rope in which the center of the rope is made of tightly coiled, high quality steel spring instead of an independent wire rope or fiber core. The outer strands of the rope are laid up in the regular J&L rotary drilling line constructions. This new J&L invention makes possible a flexible wire rope, yet provides a strong uniform support for outside strands against all the crushing action a rotary line receives. And, with all its advantages, you pay no more for SpringKore. Although it's a premium product, there is no increase in price.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH



J&L STEEL

Now that you know about J & L SPRINGKORE . . . *let's get together!*

JONES & LAUGHLIN STEEL CORPORATION
416 Gateway Center, Pittsburgh 30, Pa.
I'd like to have more information on J&L SPRINGKORE DRILLING LINES.

Name _____
Title _____
Company _____
Address _____

The thousand-mile handshake

When a company-owned Beechcraft Executive Transport is available for instant action, you and your key men find time to shake hands with field men, customers, new business prospects *regularly*. For example, you can leave at *your* convenience, cruise in relaxing comfort one thousand miles in less than five hours, tend to business, return that day. Home office work *can't* pile up.

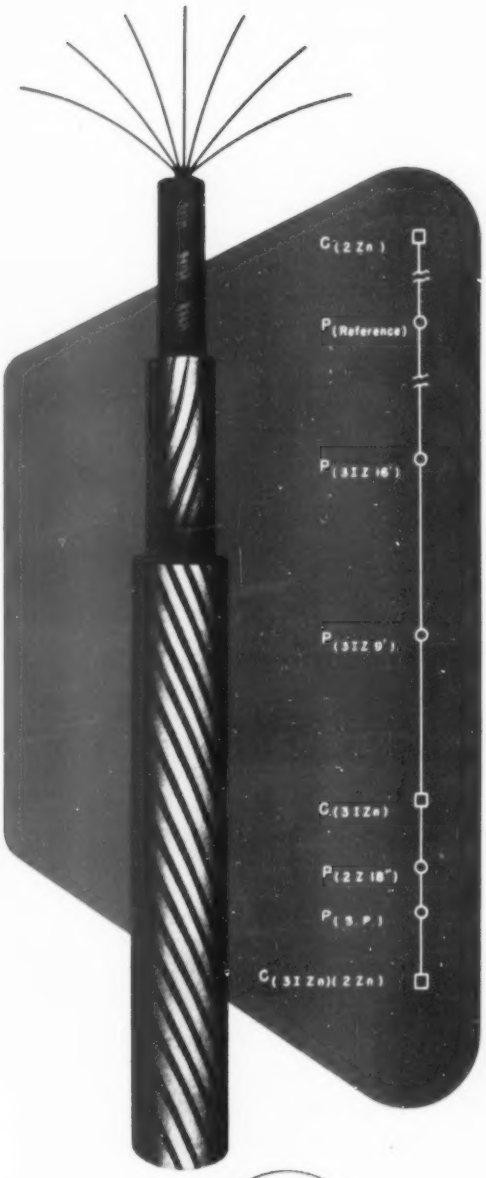
Thousands of executives use this soundproofed Beech "Twin" in just such fashion daily. In *your* business, you could use more *time*. Investigate! Typical costs and operating data on request.

☆ ☆ ☆

Call your Beechcraft distributor or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

HALLIBURTON'S FM ELECTRONIC LOGGING



MINIMIZES CABLE LEAKAGE!

Downhole potential levels are recorded at the surface with pinpoint accuracy when this vastly improved electronic logging system is used in your well. Cable leakage that tends to introduce error in ordinary systems is minimized sharply because the cable no longer is part of the measuring circuit.

Thus, long cables no longer demand constant repair or replacement when electrical leakage occurs. Operational delays are held to the minimum – an important economic factor that works to the advantage of the operator.

With Halliburton's Frequency Modulation logging system – built completely around electronic tube circuits – it is necessary to transmit down the cable to the tool only the power required to operate the circuits. This power can be transmitted at an impedance level low in comparison with line leakage to be expected even with a relatively poor cable in a deep, hot hole.

Too, with Halliburton's FM logging, vacuum tube circuits can carry several channels over a single conductor cable *simultaneously*. It takes only one trip into the hole to obtain this greatly increased amount of data – at a real savings in time for the operator.

Your Halliburton representative – just a phone call away – is ready to provide you with this FM logging service. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

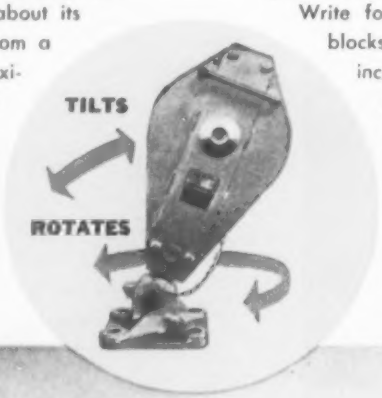
HALLIBURTON

YEARS AHEAD IN ELECTRONIC LOGGING

BIW DRILLING - PRODUCING WORKOVER EQUIPMENT

PEDESTAL SHEAVE BLOCK

BIW equipment is engineered with one idea in mind: to let you work over your wells in the most economical way. The BIW Pedestal Sheave Block is mounted on a base on the derrick floor and used in conjunction with tractor or hoisting winch for pulling rods or tubing or for swabbing. The block tilts 45 degrees each way from vertical and rotates about its vertical axis 22 degrees each way from a central position. In this way you get maximum pulling power from your winch with less wear on the wire line because there is no line rubbing on sheave edges or side plates.



TYPE NR-30 FLOOR BLOCK

The NR-30 can be installed anywhere: chained to the derrick foundation, anchored to a "dead man," or fastened down in any desired method where a concrete foundation has not been poured. This block is used with tractor or hoisting winch for swabbing and for pulling rods and tubing at medium depths. Write for the complete story on what these blocks can do to cut your drilling costs, increase your drilling efficiency. Beaumont Iron Works, one of the oldest oil country manufacturers, builds a complete line of drilling and producing equipment.

BIW

BEAUMONT IRON WORKS CO.
BEAUMONT, TEXAS

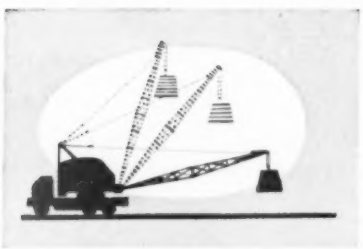
Subsidiary of American Locomotive Co.
General Sales Office: 1404 Dunlavy St.,
Houston 19, Texas
Warehouses in Beaumont and Odessa

Before you buy:

COMPARE ALL MAKES!

Marr Equipment Corp., Boston, reports HC-90, in addition to precision maneuverability, is outstanding in its stability, an important factor in pipeline welding operations.

Feature for feature . . . dollar for dollar . . . job for job . . . you can't buy better



Independent Rapid Boom Hoist provides fast, safe, power-controlled booming up and down and exact placement of all kinds of loads. You can boom, hoist, swing . . . independently or simultaneously.

WHAT makes a Link-Belt Speeder so ideal for pipeline work? Well, take the 25-ton capacity truck-mounted HC-90 for example: It delivers 92 net hp at full load speed with diesel engine, has work speeding Independent Boom Hoist, not to mention outstanding stability. It's fast, maneuverable, yet takes rugged pipelining with a minimum of maintenance or service.

Like the HC-90, every Link-Belt Speeder combines quality construction throughout with advanced design to speed your work, give you more per equipment dollar.

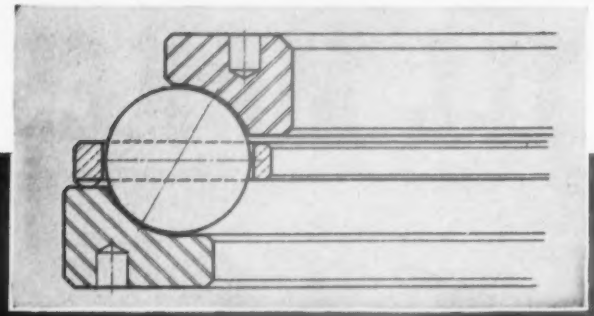
If you'd like details about this complete line of crawler, truck and wheel-mounted shovel-cranes ask your distributor or write for Catalog 2373.

LINK-BELT SPEEDER CORPORATION
Cedar Rapids, Iowa

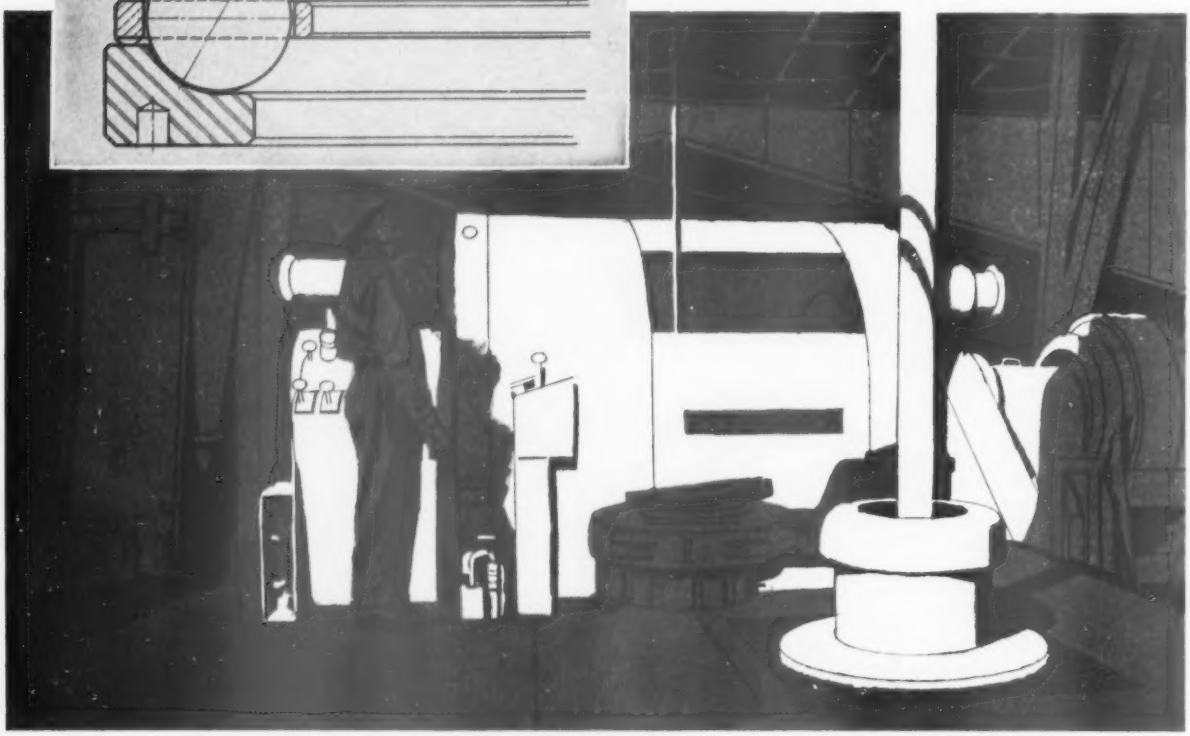
13.107

LINK-BELT SPEEDER
CORPORATION
BUILDERS OF A COMPLETE LINE OF CRAWLER, TRUCK AND WHEEL-MOUNTED SHOVEL-CRANES

FACTORY-TRAINED DISTRIBUTOR SALES AND SERVICE SPECIALISTS ...EVERYWHERE



For maximum load-bearing capacity at high drilling speeds, Bethlehem Supply Company's new B-21-TA Rotary Table is equipped with TORRINGTON Angular Contact Ball Thrust Bearings.



Designed for high speeds!

Today's deeper wells and higher drilling speeds demand the very finest in rotary table bearings. More and more drilling rig builders are meeting that demand with TORRINGTON Angular Contact Ball Thrust Bearings.

These rugged friction fighters are engineered for the tough rotary table application. They handle combination thrust and radial loads. Precision-ground from bearing-quality steels, they operate smoothly and efficiently. They are heat treated to offer maximum load capacity and excellent resistance to wear.

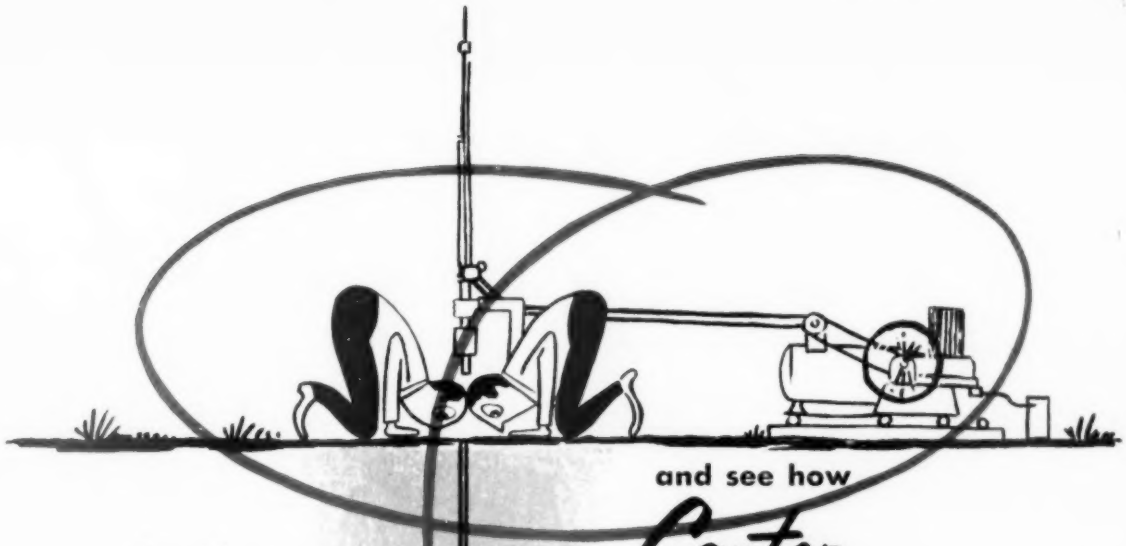
Machined, cast-bronze retainers contribute greatly to longer bearing life and lower operating cost.

Always specify TORRINGTON BEARINGS for your rotary tables. It pays!

THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.

TORRINGTON BEARINGS

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers



Let's Look Down The Well...

FAST

SLOW

and see how

Carter

long-stroke Hydraulic Pumping Units

give you more fluid per stroke . . .

When pumping, if the plunger upstroke is too fast, then the working barrel may not have time to fill up properly and give smooth even production. It is therefore important that the speed of the upstroke which gives the most even flow should not be exceeded.

Since no oil is produced on the downstroke of a sucker rod pump, the downstroke speed should be as fast as the fall of the rods will safely permit.

These two factors of speed show the importance of having the speed of the upstroke and downstroke set independently of each other . . . a slow upstroke and a relatively fast downstroke.

This system of pumping is *VARIABLE CYCLE* obtainable ONLY with the patented CARTER Long Stroke Hydraulic Pumping Unit.

Over 600 of these units are now doing a successful job in oil fields all over the U.S. and Canada and abroad.

Designed — Built — Priced

For Stripper Wells

WRITE FOR BULLETIN PR-253

Carter unit on location in South Texas.

S. C. Carter COMPANY, inc.

1900 Santa Fe Avenue, Los Angeles, California

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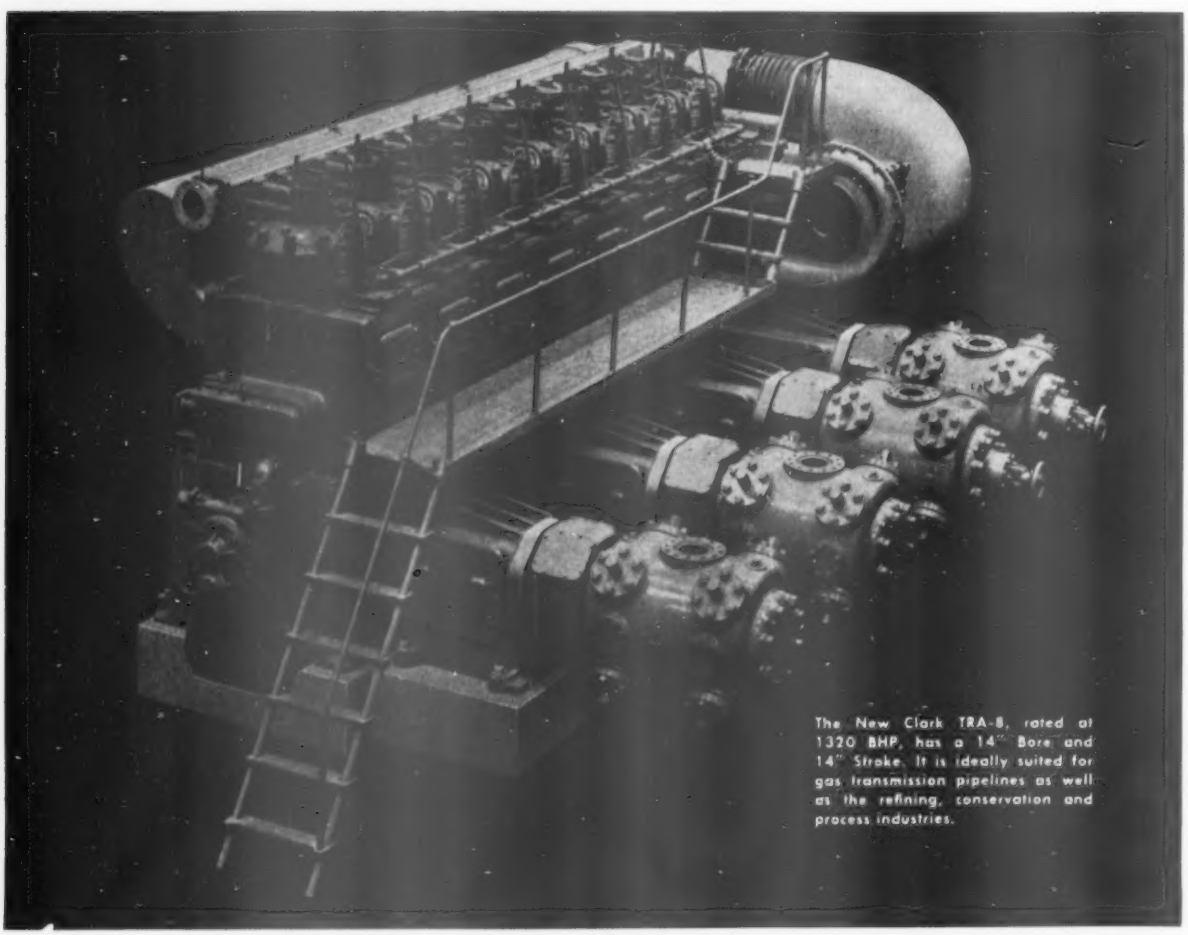
ITS HERE! a

The NEW Clark 2-Cycle



The New Clark TRA-8, rated at 1320 BHP, has a 14" Bore and 14" Stroke. It is ideally suited for gas transmission pipelines as well as the refining, conservation and process industries.

Clark Continues to Set the Pace in Compressor Progress

revolutionary compressor development!

Turbo-Charged "Right Angle"

It's here — after seven years of intensive development. Clark revolutionizes compressor design with the first 2-Cycle Turbo-Charged Gas Engine Driven Compressor . . . the TRA. Another Clark first! A precedent-shattering development that makes possible —

50% MORE POWER

Developing 1320 bhp, the TRA-8 delivers 50% more power than any comparable compressor, with *no* encroachment on overload carrying ability.

SHARPLY REDUCED FUEL CONSUMPTION

The TRA is conservatively rated *and guaranteed* to burn substantially less fuel than *any* gas engine driven compressor now built.

25% LESS COOLING WATER LOAD

(Including scavenging air intercooler load.) Vast amounts of waste heat are recovered from the exhaust gases by the Clark Turbo-Charger and are converted to useful work.

FLAT FUEL CONSUMPTION CURVE

Fuel consumption remains practically constant over a wide range of load conditions.

QUIET

Energy goes into power, rather than noise. Much quieter than a conventional gas engine driven compressor. No exhaust pulsations.

UNPRECEDENTED RUGGEDNESS

Tremendous stamina, unapproached by any other compressor design. Conservative BMEP rating.

COMPACT IN-LINE DESIGN

Very economical of floorspace, foundations and building requirements, yet highly accessible.

•

The Clark TLA, with 17″ bore and 19″ stroke, is also available when units of even greater horsepower than the TRA are required. For complete engineering details — the facts behind this revolutionary compressor development — see your nearest Clark representative and write for Bulletin 130.

CLARK BROS. CO. • OLEAN, N. Y.

DIVISION OF DRESSER OPERATIONS, INC.

SALES OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

CLARK compressors

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WHY WE RECOMMEND AXELSON...

Axelson gives you a string of sucker rods as straight as a rifle barrel and as tough as they come.

They are made in five grades from alloys specified by Axelson after 61 years of research and field experience.

They are heat treated in automatically controlled furnaces developed for that purpose.

They are normalized from END TO END before threading.

The forging dies, the turning and threading tools, and the equipment in which these things are used are amazingly accurate.

Forty-eight years in the supply business enable us to be helpful in your selection of grade and size, or combination of sizes.

Let's talk Axelson. *There is no economical substitute for quality.*

PESA

JONES & LAUGHLIN STEEL CORPORATION
SUPPLY DIVISION

J&L STEEL

General Offices: TULSA, OKLAHOMA

88 STORES • 19 OFFICES • 9 RESIDENT SALESMEN

EXPORT: 405 Lexington Ave., New York, N. Y., U. S. A.

Most versatile medium-range radio station... RCA Carfone Station Unit "15"

IT'S EASY TO CARRY as your traveling bag. The case is only 19⅜" long, 10¾" high, and 9⅜" deep.

IT CAN BE SET UP ANY PLACE where there's 115-volt, a-c supply—forestry, utilities, construction projects, etc.

IT'S IDEAL for 2-way operation (police, fire, etc.) in small and medium-size municipalities requiring medium-range communication equipment.

FOR ALL-AROUND USE . . . for portable or fixed-stations, here's your best buy . . . the RCA Carfone 2-Way Radio Station Unit "15."

It is complete with transmitter, receiver, power supply, portable antenna, handy microphone, and loudspeaker . . . all in a single package.

Easy to carry and easy to set up, this portable unit can be operated wherever there is a 115-volt, a-c outlet.

For fixed station use, place the unit on the operating desk, hook up the antenna, plug in the power cord, and you're set to go. For portable station use, simply connect the quarter-wave, whip antenna (supplied) and plug in the power cord. No extra components to carry around. No installation expense involved.

Greatly improved receiver selectivity reduces adjacent channel signals well below interference levels. A newly designed transmitter modulation control enables you to transmit the full signal potential of the transmitter and maintain one-hundred-per-cent modulation at virtually all voice levels—*whether you shout or whisper into the microphone.*

For complete information, MAIL COUPON TODAY.

RCA®

RADIO CORPORATION of AMERICA

COMMUNICATIONS EQUIPMENT

CAMDEN, N. J.

Communications Section, Dept. 89 RE
Building 15-I
Radio Corporation of America
Camden, N. J.

Please send me complete details on the RCA Carfone Station Unit "15."

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE____

more and more refineries..... * find KEY-KAST fittings and flanges right for their alloy piping needs!

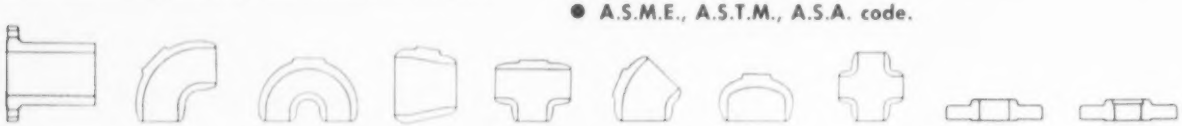
Key-Kast alloy welding fittings and flanges are available in low and intermediate alloys and various stainless steels.

* *a few* KEY-KAST *users:*

Gulf Oil Corporation
Union Oil Company of California
Phillips Petroleum Company
Sun Oil Company
Atlantic Refining Company
The British American Oil Co., Ltd.

HOW DO THESE ADVANTAGES FIT *YOUR* ALLOY PIPING NEEDS?

- Greater wall thickness throughout—for increased structural strength.
- *Extra* thickness in critical areas—for greater allowance against corrosion and erosion.
- Controlled quality . . . through rigid metallurgical control . . . produced, inspected and tested in one plant.
- Low unit cost . . . plus prompt deliveries.
- A.S.M.E., A.S.T.M., A.S.A. code.



Write for complete information and prices.

Key company

Since 1916 . . . manufacturers and developers of products for high temperatures and pressures

BOX 494-A, EAST ST. LOUIS, ILLINOIS

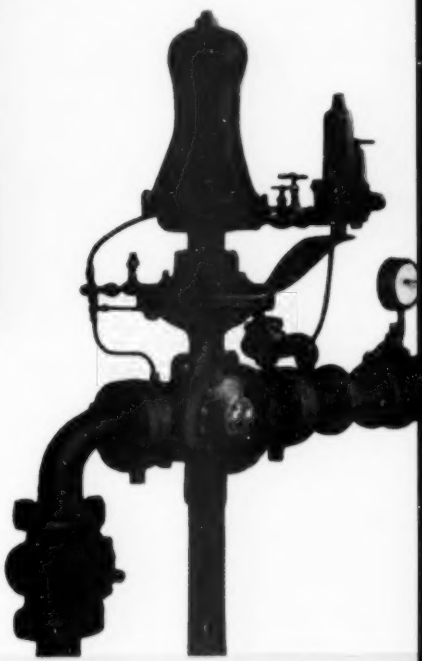
DISTRICT OFFICES: NEW YORK • CLEVELAND
CHICAGO • TULSA • HOUSTON • LOS ANGELES

STURDY SENTINELS
OF SECURITY

On guard over the skyline of Houston, Texas, stands this sturdy Rockwell High Pressure Balanced Valve regulator. Quick operating, positive acting Nordstrom valves complete a picture of gas line security that gives the rightful impression of better service and protection from the use of the finest, safest equipment.

THE SERVICE EASE AND ECONOMY OF REPLACEABLE VALVE CHAMBERS

Rockwell regulators rarely, if ever, need be lifted for service. That's because all parts subject to wear or abrasion can be economically replaced *with the regulator in the line*. The valve chamber can be easily removed through a hand hole area in the body. A new or rebuilt assembly having either hard or soft seats readily bolts in its place. And the capacity of the regulator can be changed at will by substituting a different size valve chamber on the same bolt circle.



SERVE WELL WITH SAFETY

Above is pictured a pilot loaded Rockwell high pressure regulator with auxiliary spring control. This control operates as a conventional pilot loading system unless the loading pressure falls below the amount required for proper operation. If that occurs, the auxiliary spring control automatically takes over at a slightly lower outlet pressure.

ROCKWELL *Balanced Valve* REGULATORS

HERE'S A TRIPLE SURE ROCKWELL SETTING

Installation of Rockwell No. 4 meters fitted with Combined Record gauges. Pressure is governed by spring loaded Rockwell High Pressure Balanced Valve regulator. All lines are Nordstrom valve controlled.

You Can RELY ON ROCKWELL

FOR SERVICE EASE

Illustrating how entire working mechanism of a Rockwell large capacity meter lifts from the bowl type body as a single unit for economical replacement with either a new or repaired duplicate.

FOR MAXIMUM SERVICE LIFE AND REVENUE

Rockwell Manufacturing Company has the right combination of meters, regulators and valves for any industrial setting. Engineered measurement and control groupings can be made from the most complete range of sizes and types available. For your next installation go Rockwell all the way. You'll buy maximum service satisfaction at lowest overall cost per cubic foot measured.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. • Atlanta • Boston • Chicago • Houston • Kansas City • Los Angeles
New York • Pittsburgh • San Francisco • Seattle • Tulsa

There's a ROCKWELL METER and REGULATOR for every use

METERS

TIN ALUMINUM CAST IRON PRESSED STEEL

REGULATORS

INDUSTRIAL SERVICE "1001" BALANCED VALVE

Highly specialized process controls are used to produce the finest in seamless WELDING FITTINGS

Only Globe, among manufacturers of welding fittings, produces its own seamless steel tubes. Specialized processes at every stage of manufacture from billet to tube — to fitting — insure uniform high quality. Thorough inspection and continuous laboratory control guarantee strict conformity to rigid specifications.

Now . . . you can get these high-quality fittings when you need them — in the quantities you want. Just get in touch with your nearest Globe distributor.

GLOBE STEEL TUBES CO., Milwaukee 46, Wisconsin
Chicago • Cleveland • Detroit • New York • Philadelphia • St. Louis
Denver • Houston • San Francisco • Glendale, Cal.

Producers of Globe Welding Fittings — Globe seamless stainless steel tubes — alloy — carbon seamless steel tubes — Gloweld welded stainless steel tubes — Globeiron (high purity ingot iron) seamless tubes.

AVAILABLE IN A COMPLETE LINE OF SIZES AND WEIGHTS THROUGH GLOBE DISTRIBUTORS IN ALL KEY CITIES

Here is one of the highly specialized manufacturing operations that insure Globe quality — piercing the billet to form a seamless tube.

Send for the Globe Welding Fittings catalog.

SPANG® OIL FIELD

SPANG DOUBLE SEAL SHRINK THREAD DRILL PIPE AND TOOL JOINTS—The accurately mating seals in Spang's Double Seal Shrink Thread Drill Pipe & Tool Joints are the major reasons for these advantages reported by drillers:

- Reduction in failures and costly down-time
- Complete sealing against internal and external pressures
- Rapid replacement of tool joints right at the rig

SPANGWELD—Developed with the double purpose of reducing the initial as well as the operating cost of drilling strings, Spangweld Drill Pipe combines these major construction features:

- Tool joints flash-welded to drill pipe
- Streamlined exterior contour
- Pipe and joint combinations in a complete range of internal and external diameters for every drilling requirement
- ⅔ less threaded elements than conventional drill pipe and tool joint strings for faster handling

SPANG EXTREME LINE CASING—Here are seven good reasons why it pays to use this precision-manufactured casing for the really tough jobs:

- High joint strength
- Positive fluid seals
- Maximum running efficiency
- Minimum outside joint diameter
- Resistance to thread damage
- Streamlined interior and exterior contours
- Integral joints which eliminate half the threaded connections

SPANG GRADE P-110 EXTREME LINE CASING— Developed and precision-manufactured to meet the requirements of today's deep well drilling conditions, Spang Grade P-110 Extreme Line Casing has these features:

- Greater collapse, bursting and tensile strength than grades J-55 and N-80
- The ability to withstand the highest tensile loading and most extreme pressures encountered

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

TUBULAR PRODUCTS

SPANGSEAL TUBING—Designed for the economical production of high pressure condensate and flowing wells, Spangseal has these 5 major features which distinguish it from conventional threaded and coupled tubing:

- The integral joint with only two threaded elements
- The streamlined exterior contour which virtually eliminates "hanging-up"
- Metal-to-metal conical sealing surfaces at male and female thread ends which provide maximum leakage resistance
- The reduced outside diameter of the joint which increases hole clearance

SPANG EXTREME LINE TUBING— This precision-made tubing has an extremely high joint strength which makes it particularly useful for recovery from deep wells and high pressure wells. Here are some of the unique features and advantages characteristic of the Spang Extreme Line Tubing Joint:

- Wide, rugged Acme threads which provide fast joint make-up and maximum running speed
- The metal seal at small end of joint provides positive resistance to leakage
- 100% joint strength in all weights
- 50% of threaded connections eliminated by integral type joint giving high resistance to damage
- Streamlined interior and exterior contours, the first of which lends itself to the maximum protection given by plastic coating
- Positive shoulder contact engagement of male to female with adequate bearing assures proper make-up

Since the earliest days of the industry, Spang has been a familiar name throughout the world of oil. From the Spang-Chalfant Mills has come a complete line of standard and specialized oil country tubular goods, backed by a continuing, extensive research program which is geared to develop the most advanced products for economical drilling and production.

In these six tubular products you'll find the outstanding features which are evidence of the workmanship and quality behind the Spang trademark. Spang's day-by-day association with the petroleum industry is your continuing guarantee of dependable products and service.

THE LATEST BULLETINS on Spang Tubular Products contain more valuable information you'll want for your reference files. Write now for your copies or ask at the nearby National Supply Store.

SPANG-CHALFANT DIVISION

THE NATIONAL SUPPLY COMPANY

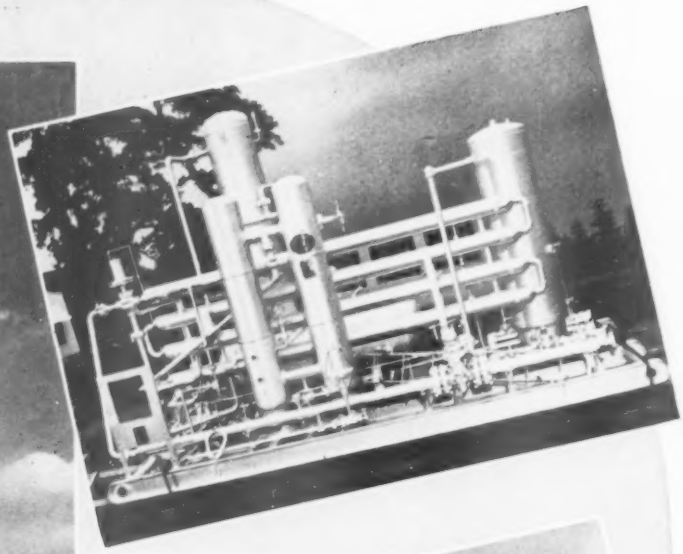
PITTSBURGH 30, PENNSYLVANIA

NATIONAL BLUE PRODUCTS

DIVISION TUBULAR OFFICES: DENVER, COLORADO • HOUSTON, TEXAS FORT WORTH, TEXAS • LOS ANGELES, CALIFORNIA • PITTSBURGH, PENNSYLVANIA • TULSA, OKLAHOMA • CALGARY, ALBERTA, CANADA

PARKERSBURG HYRECOS..

...are designed to fit *YOUR* wells, not just *ANY* well!



For maximum profits and the most efficient and trouble-free operation, you need a cold separation unit that is built to deliver outstanding performance on YOUR well . . . not just a "good" job on almost ANY well.

This is exactly what Parkersburg Hyrecos are designed to do. Each one is a combination of basic elements assembled to fit ONE SPECIFIC APPLICATION.

Parkersburg, inventor and pioneer of cold separation, has proved by years of experience and trial that no one combination can possibly fit all applications . . . a "universal" cold separation unit is as impossible as a universal hat.

Ask your Parkersburg Representative for complete data on the correct Hyreco installation for your cold separation problem.

PARKERSBURG
Pioneer and Leader in
COLD SEPARATION

PESA
PARTNERS IN PETROLEUM PROGRESS

No. 5312

PARKERSBURG
PRESSURE EQUIPMENT

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • HYDRACEPTER • SCRUBBERS • TREATERS • HEATERS

Manufactured in Houston, Texas

They Say—

More Pipe Lines Needed

"Big arteries and smaller veins through which the economic and military life blood of a great nation can flow still need to be built. Since 1943 the stork has brought us 21,000,000 new citizens—equal to the population of Canada and half as many again.

"All these and their fathers and mothers are clamoring for more oil for energy, for heat, for lubrication, and a thousand other uses and byproducts including synthetic rubber—7,000,000 bbl. a day.

"America has grown to greatness as the diameter of its pipe lines has grown from 2 in. in a 5-mile line to 26 in. in a vast network now reaching 163,000 miles, equal to more than six times around the world."

L. S. Wescoat, board chairman of American Petroleum Institute and president of Pure Oil Co., speaking at West Texas Gulf Pipe Line dedication, Colorado City, Tex.

Oil's Disappearing Profit

"The 55,000 oil wells the government, through the Petroleum Administration for Defense, has requested can never be built on the price of crude pegged 5 years ago with no increase since then save and except the 50-cents-a-barrel increase granted in California last year.

"The operators east of the Rockies have seen their costs increase 41 per cent since the last crude increase. They are suffering. The drilling operations will decline. Our defense effort will be impaired. Our economy nation wide will suffer unless this present disappearing profit is corrected by a proper compensating price increase in crude."

Ernest O. Thompson, chairman, Texas Railroad Commission, speaking in Colorado City, Tex.

Freedom First, Technology Second

"I devoutly believe that the key to the greatness of our industry has been its freedom. Freedom of enterprise has resulted in an abundance of crude petroleum. Of course we must have raw material before we can refine it, at the present time. But our unique national talent for rapid technological development is a great asset too. I say this because if and when we ever run short of crude oil, we can and will synthesize the necessary petroleum.

"However, I feel we must put free-

WECO... the UNIONS you can trust for Sealing and Service

Selected Raw Materials

Advanced Manufacturing Practices

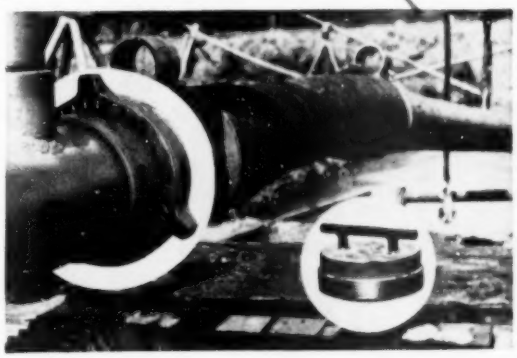
Ball and Cone Seat

Rugged Acme Threads

Heavier Wall Sections

Precision Seating Surfaces

• WECO Fig. 400 union on pump suction line. Blanking plug, foreground, simplifies compounding.



Selected Raw Materials

• Quality in WECO Unions starts with the forgings or castings which are produced according to our own critical specifications. These are obtained from sources best qualified to meet our exacting requirements.

WECO Unions from Fig. 200 through Fig. 1502 are steel forgings or steel castings. The WECO Fig. 100 Union (1,000 psi Test) is made of highest quality certified malleable iron.

What does this mean to you? It means that WECO Unions are stronger, tougher, more durable . . . will withstand more use and abuse. It means you're sure of longer life and perfect sealing, even in the toughest oil country service.

Whether you need a high or low pressure union, you can trust WECO's for maximum service and perfect sealing.

Ask your Supply Store for the WECO Union you need. There's a size and pressure to meet every oil industry requirement.

PESA

SOLD EXCLUSIVELY THROUGH SUPPLY STORES.

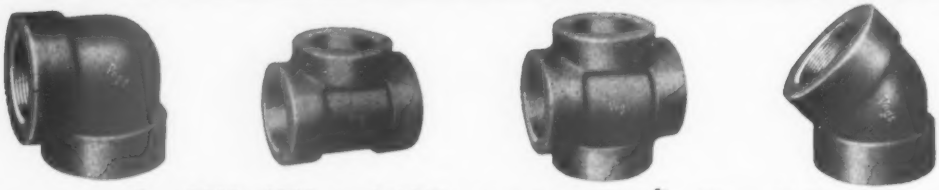
It's Wise to Standardize with... WECO...

WELL EQUIPMENT MFG. CORP.
Division of Chiksan Company
HOUSTON 1, TEXAS
CHIKSAN COMPANY
Brea, Calif. Chicago 28, Ill. Newark 2, N. J.
CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

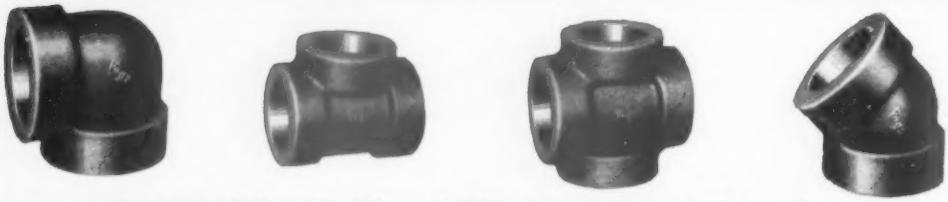
STRENGTH

for Safety and Long-Time Service



For 2000, 3000 and 6000 pounds service — Sizes 1/8" to 6"

SCREW END TYPE



For schedules 40, 80 and 160 pipe — Sizes 1/8" to 4"

SOCKET WELD TYPE

Vogt Ells, Tees, Crosses, etc., are forged from carbon steel or various alloys to meet specific operating conditions. Catalog F-9 will aid you in their selection and proper application.

Shocks and stresses imposed by high pressures and high temperatures are taken in their stride because Vogt fittings are uniform in structure, fine grained, and free from porosity . . . the superior product of laboratory controlled materials and giant forging hammers and upsetters. These properties also give higher resistance to erosive and corrosive conditions, thereby adding to service life expectancy in steam plants, petroleum refineries, chemical plants and related industries.

HENRY VOGT MACHINE CO., INC.
Louisville 10, Kentucky
BRANCH OFFICES: NEW YORK • PHILADELPHIA • CLEVELAND • CHICAGO • DALLAS

Vogt

DROP FORGED STEEL FITTINGS

dom first and technology second, because even our petroleum technology would not have developed so far except under the free enterprise system (including the patent system). It is the superb living standard of 150 million people under our free-enterprise system that has created and will sustain an enormous market for petroleum products."

Bruce K. Brown, president, Pan-Am Southern Corp., speaking before the Kansas City Oil Men's Club.

Flexible Quotas on Imports

Sir:

Why is there an import problem at this time? There is a problem primarily because countries of the Near East have inordinately increased their production and are seeking outlets . . . A part of our market should be available to these nations, it does not make sense to shut our markets to the world. The Simpson bill would do just that whenever a single business claimed to be injured.

Of course, our own industry should not be allowed to be ruined by a do-nothing policy as to imports. But the present policy is not a do-nothing policy. The Tariff Commission did recently investigate the effect of the lowered duties on crude oil and fuel oil and the elimination of the quota and, as I see it, found no serious injury to the industry. It would seem to me that for the present the industry should wait a reasonable time then request a new study.

For the long pull, we should, I submit, adopt by law the principle of flexible quotas because limitations as now sought in some of the bills are fraught with hazards.

Emby Kaye, Tulsa.

Industry Should Solve Oversupply

"The oil industry has traditionally solved its recurrent problem of oversupply by expanding its markets, by finding new and better ways to use oil and oil products for the benefit of all. That's the way this problem should be treated now—not by regulatory legislation.

"Quotas and legislation look so easy, but they are not practical. You can't cut anything without first setting up a government board. As soon as you walk into that bear trap, you have created an instrumentality by which the Government can do as it wills. And don't forget, a board can move quotas and prices in either direction—up or down.

"If independent oil producers get into bed with John L. Lewis, the coal industry, the coal-carrying railroads for the sake of expediency, then we're going down the road to full control over end use of oil products."

J. Howard Marshall, vice president,

Republic WIRETEX AIR HOSE

Strength of Steel PLUS+ Flexibility of Rubber

. . . and there's a NEW ECONOMY LENGTH

WIRETEX, combining the strength of steel with the flexibility of rubber, brings you economical hose performance. Republic WIRETEX Air Hose easily handles air pressures up to 2,000 psi — and is ideally suited to work on less rigorous jobs, too, where extra service life and trouble-free performance is an asset.

Republic WIRETEX is NEW — a truly modern conductor internally reinforced with high tensile wire. It's easy to handle, unbelievably tough and long lasting. What's more, Republic WIRETEX is built in 60-foot **Economy Lengths.** You save money when you buy Republic WIRETEX; time and money when you use it! Get the facts today! Republic WIRETEX Hose is available in all standard (3/8" to 2" inclusive) sizes.

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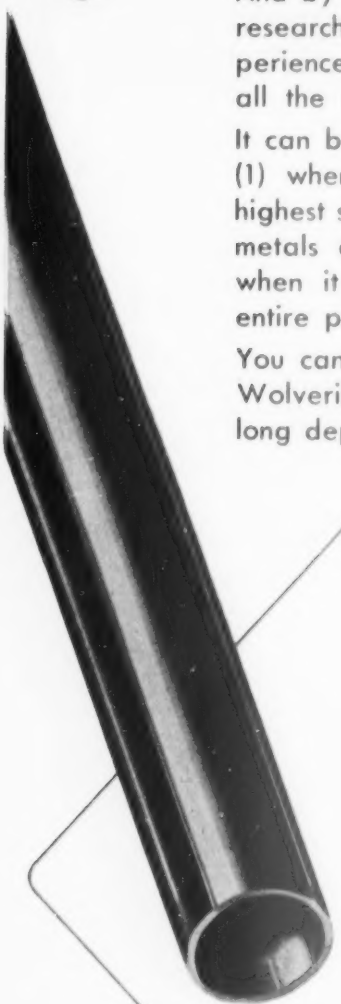
Jones & Laughlin Steel Corporation
Supply Division
P. O. Drawer 2481, Tulsa 2, Okla.

WEST COAST DISTRIBUTORS
W. C. Hendrie & Company, Inc.
405 Towne Ave., Los Angeles, Calif.
Pacific Coast Rubber Company
51 Main St., San Francisco, Calif.

"Quality Hose Builders for More Than 50 Years"

REPUBLIC RUBBER DIVISION
LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO
INDUSTRIAL RUBBER PRODUCTS

it takes "Tube-manship"



And by "tube-manship" we mean the combination of research and engineering with long, tube-making experience to produce the quality of tube that will meet all the requirements which its application demands.

It can be said that a tube possesses "tube-manship" (1) when all its dimensions conform consistently to highest standards, (2) when it is made of dependable metals and alloys according to best practices, (3) when it has passed rigid inspection throughout its entire production.

You can feel confident in purchasing and using any Wolverine product. It proves its tube-manship in the long dependable service it will give you.

PLAIN CONDENSER TUBES — Copper and copper base alloy in sizes from ⅝" to 2" O.D.

FINNED TUBES FOR CONDENSERS — Wolverine Trufin*—the integral finned tube—distinguished for being able, (1) to provide increased surface area in a given space, (2) to resist vibration, (3) to withstand sudden temperature changes, and (4) to be formed as easily as plain tube. Made in wide range of sizes, fin heights and spacings. Available In copper, copper base alloys and in bi-metal.

Send for our latest catalog sheet giving further information

Wolverine Welcomes Your Tubing Problems

WOLVERINE TUBE DIVISION

of CALUMET & HECLA, INC.

Manufacturers of Tubing Exclusively

1459 CENTRAL AVENUE • DETROIT 9, MICHIGAN

ESTABLISHED 1916

Plants in Detroit, Mich. & Decatur, Ala. *Sales offices in Principal Cities*

EXPORT DEPT., 13 E. 40th ST., NEW YORK 16, N. Y.

Wolverine Trufin and the Wolverine Spun End Process available in Canada through the Unifin Tube Co., London, Ontario.

*REG. U. S. PAT. OFF.

†A PATENTED PROCESS RE. 22485

to make good tube

The Wolverine "Tube-manship" upon which you rely for top-quality nonferrous tube— now assures you of dependable Wolverine Electric-Welded Steel Tube

The combination of Wolverine engineering and thirty-seven years of tube-production experience assures you of top-quality tube that meets your most exacting demands. Rigid quality-control measures (standard everyday practice at Wolverine) assure design and product engineers of uniform diameter, concentricity, weight and other structural advantages. All these mean improved product efficiency at minimum production cost.

Wolverine produces electric-welded steel tubing in sizes ranging from: ¼″ through 3″ O.D.
Analyses: SAE 1010, SAE 1015, SAE 1020, SAE 1025, SAE 1030.

In addition to manufacturing top-quality tubing of copper, copper base alloys, aluminum, bi-metal and electric-welded steel—Wolverine can also help you with such matters as the selection of the tube and alloy that will best meet your particular operation conditions. Wolverine's Customer Engineering Service is always ready to answer questions concerning choice of alloys, size, and temper for a given use, or help you with problems dealing with corrosion, heat transfer or tube fabrication.

ESTABLISHED 1916

WOLVERINE TUBE DIVISION
of CALUMET & HECLA, INC.

Manufacturers of Tubing Exclusively

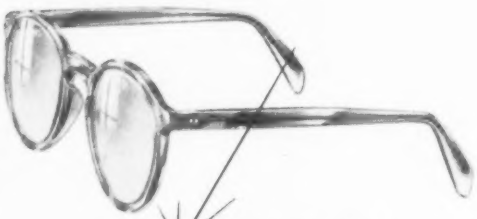
1459 CENTRAL AVENUE • DETROIT 9, MICHIGAN

Plants in Detroit, Mich. & Decatur, Ala. *Sales offices in Principal Cities*

EXPORT DEPT., 13 E. 40th ST., NEW YORK 16, N. Y.

Eye Protection

Good Looking and Serviceable!



AO'S New SPATULA TEMPLE for F9200 Series Plastic Safety Glasses

Here, at last, is a temple a man can put on and take off without effort. The flat tip of the temple acts as a cushion behind the ears and is more comfortable than the skull type. Material is cellulose acetate butyrate (identical to the F9200 frame) and encloses a metal core. Standard temples are 4¼″, 4½″, 4¾″ and 5″ fitting values. These new temples (AO No. 178) will be particularly appealing to women workers because they will not disarrange the hair. Your nearest AO Safety Products Representative can supply you.

QUICK REFRESHER FACTS ON AO F9200 SERIES SAFETY GOGGLES

Material — Lightweight, durable, non-flammable cellulose acetate butyrate, transparent or green. Available with or without side shields.

Lenses — 6 Curve Super Armorplate or 6 Curve Super Armorplate Calobar, conforming to and covering eye orbit. Super Armorplate lenses may be ground to worker's prescription.

Side-shields — Perforated acetate for comfort and to help prevent lens fogging.

Bridge — Strong yet lightweight and face formed for added protection.

Nose Pads — Hold firmly and comfortably. Weight of Safety Glasses is distributed broadly for extra comfort.

Temples — In addition to the new Spatula type, either comfort cable or skull temples are available.

Sizes — Wide selection of eye sizes and bridge sizes to fit all faces.

AO also makes available a complete line of Protective Clothing and Respirators for many uses in Industry.

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Signal Oil & Gas Co., Los Angeles, addressing the American Petroleum Institute Division of Production district meeting, Los Angeles.

Steel Tubular Production Up

"The oil and gas industry buys and uses steel in many forms, the major one being tubular products. Your industry accounts for roughly 50 per cent of the total steel tubular market. It is no wonder that in the daily press of trying to satisfy your operating and production departments, many of you may have concluded that there just were not at present nor would there ever be enough pipe mills. By the end of this year, the records will show that in the postwar period annual steel ingot capacity has increased about 31 per cent. Pipe and tube mill annual capacity in the same period has increased 65 per cent.

"The steel tubular industry, formerly one of the most concentrated in the sense that almost all pipe was made in the Pittsburgh-Youngstown-Lorain area, now is geographically widely dispersed. There are at present more than 100 pipe and tubing producers, with capacities ranging from a few hundred tons of redrawn pressure tubing to many thousands of tons of 30-in. pipe.

"By January 1 of next year, total pipe and tube capacity will be capable of producing 13,800,000 tons annually. The biggest year of actual production was 1951, at 9,900,000.

Henry J. Wallace, vice president, National Tube Division of United States Steel Corp., addressing the oil-company buyers' group at the annual meeting of the National Association of Purchasing Agents.

East Is Reserves Center

"Today . . . the center of crude-oil reserves has shifted from the Western to the Eastern Hemisphere. And because of the foresight and persistence of some American oil companies, the free world has access to the great new Middle East reserves.

"The historic concentration of crude reserves in the U. S., plus the fact that we were the world's greatest producer of goods and energy, acted as a deterrent to a protracted war against us. The shift in the center of world crude reserves has weakened this deterrent. Today, with a greatly increased demand for petroleum, we are growing more dependent on the reserves of the Middle East, a source of supply which is a good distance from the U. S.

"Meanwhile, the Eastern Hemisphere has become independent of the Western Hemisphere for its oil supplies. Its petroleum demands, once filled by the U. S. and Venezuela, are now supplied by the Middle East. Once a net exporter of petroleum, the U. S. is now a net importer, thus reversing a traditional pattern of commerce."

A. C. Long, president, The Texas Co., in an article for Yale Scientific Magazine.

CALENDAR OF EVENTS

JUNE

June 29-
July 3 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

JULY

July 30-
Aug. 1 Wyoming Geological Association, eighth annual field conference, University of Wyoming, Laramie.

AUGUST

17-19 Society of Automotive Engineers, international West Coast meeting, Georgia Hotel, Vancouver, B. C., Canada.

18-21 American Institute of Electrical Engi-

NO! JONES! THE LARGE HOLE IN THE LEHMANN SPINDLE IS NOT THERE FOR YOU TO REST IN WHILE WORKING!
But Boss and workers agree that you get amazing new efficiency with these
LEHMANN Large Hole DOUBLE-ENDER Hydratrol Lathes!
42" swing, 16 foot bed, 18" hole in spindle —Special headstock for short work piece. Semi-automatic multiple, longitudinal and cross feeds hydraulically operated on both ends of headstock.
50" swing—50 foot length, 19" hole in spindle. 24" Hexagon Turret on carriage with profile bar for profile boring and grinding. Retractable diamond profile wheel dresser. Weight 72,000 lbs.
Double End Hydratrol Lathes are built in sizes from 18" with holes up to 7 1/8" to larger sizes with holes to suit the job. Double End operations avoid necessity for resetting the work, and insure relative concentricity of boring and turning operations and squareness of faces at both ends.
Boring Tools by Lehmann
LEHMANN MACHINE COMPANY
GRAND at CHOUTEAU • ST. LOUIS 3, MO.
DIVISION OF NOVO ENGINE CO.

Rx for Pumping More use HAPPY Chain

HAPPY ADJUSTOCRANK*

The ultimate in desirable crank design because it's the SAFEST, SPEEDIEST and SIMPLEST adjustable rotary crank available.

1. Weight position is actuated by a long acme threaded screw with a three inch steel bar for guide.
2. Only one man and one wrench are required to adjust weights.
3. Outer orbit of crank has floor clearance of three inches or more.
4. ADJUSTOCRANKS *with* BEAM WEIGHTS — the *real* answer to counter-balancing.

*Reg. TM

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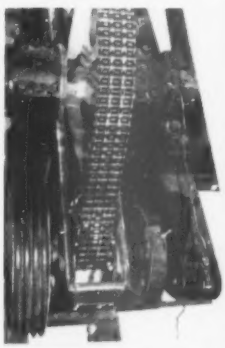
Happy chooses CHAIN DRIVES as the power train because:

1. CHAIN IS FLEXIBLE . . . unlike the rack and pinion, a chain fits perfectly around and on many sprocket bearings simultaneously. Thus all stresses, shears and strains are divided over many bearing points and areas.
2. POSITIVE LUBRICATION . . . chain has many oil films because of the many contacts between rollers and sprocket teeth.
3. RESERVE POWER IS PLENTIFUL — performance has proved the extremely high reserve capacity of a chain drive before distortion or breakage. With roller chain, tension members are separate and distinct.



With 5 sizes to choose from, each engineered to produce the maximum fluid at the least cost, HAPPY has a *Single Reduction*, high ratio pumping unit, for engines or electric motors, to master your pumping problems. Whether it's a primary, re-pressuring, or water flood operation, you can depend on HAPPY CHAIN DRIVEN PUMPERS to out-produce . . . out-last . . . all others at lower costs. For full information call or write any HAPPY office.

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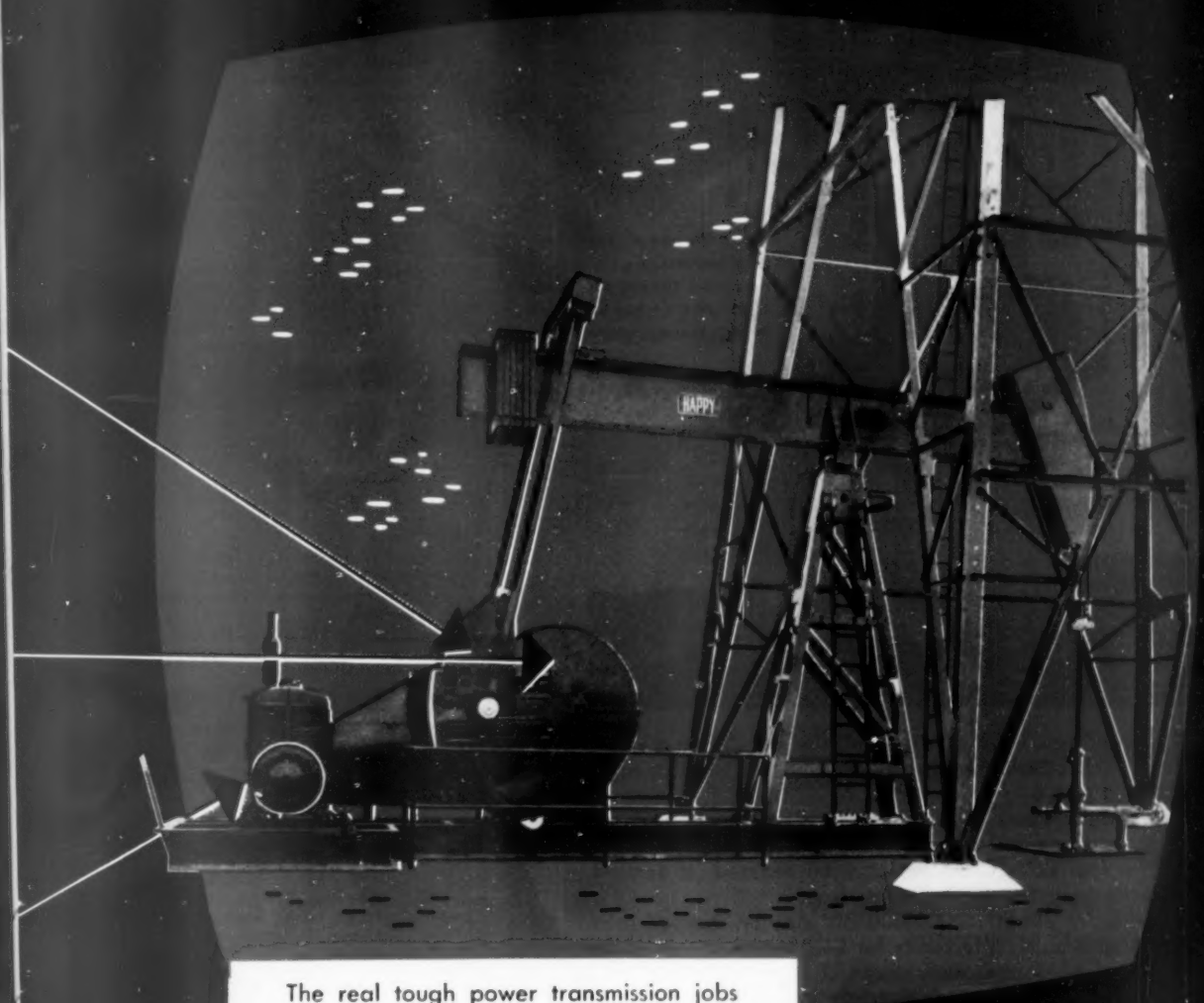
- Complete Stocks Industrial Hose

Fluid at LESS COST
Driven Pumpers



The real tough power transmission jobs
in the OIL FIELDS
are
Diamond Roller Chain Drives

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Struthers Wells

FIRED HEATERS

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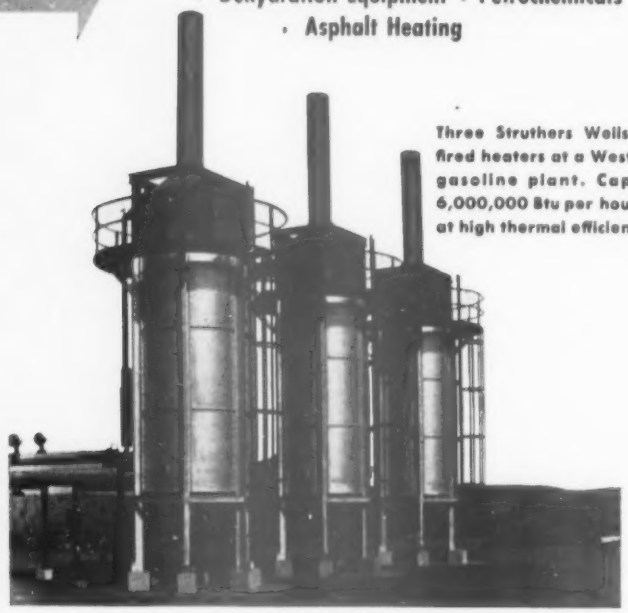

Three Struthers Wells direct fired heaters at a West Texas gasoline plant. Capacity: 6,000,000 Btu per hour each, at high thermal efficiency.

Where indirect heating is utilized, the circulating medium may be oil or Dowtherm, with the Dowtherm used in vapor or liquid phase.

Heating systems may be supplied complete with all instruments, controls, and burners.

High thermal efficiencies may be secured, if desired, using finned tube convection surface.

Heaters to about 10,000,000 Btu may be shipped completely assembled and ready for field erection, except for structural platforms, and stacks. Larger units are field assembled, but require a relatively small amount of labor.

Quick deliveries are available in an extensive line of standard sizes.

Struthers Wells

STRUTHERS WELLS CORPORATION

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Plants at Warren and Titusville, Pa.

Representatives in Principal Cities

neers, Vancouver Hotel, Vancouver, B. C.

24-26 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, Va.

Aug. 31-Sept. 1 Interstate Oil Compact Commission, Northern Hotel, Billings, Mont.

SEPTEMBER

6-11 American Chemical Society, national meeting, Conrad Hilton Hotel, Chicago.

9-11 Pacific Coast Gas Association, San Francisco.

11-12 Association of Desk and Derrick Clubs of North America, annual meeting, Cosmopolitan Hotel, Denver.

13-16 American Institute of Chemical Engineers, Fairmont and Mark Hopkins hotels, San Francisco.

15-16 American Petroleum Institute, executive committee, Greenbrier Hotel, White Sulphur Springs, W. Va.

16-18 National Petroleum Association, annual meeting, Hotel Traymore, Atlantic City, N. J.

21-25 Instrument Society of America, national instrument conference and exhibit, Sherman and Morrison hotels, Chicago.

24-25 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.

27-30 American Society of Mechanical Engineers, annual conference, petroleum division, Rice Hotel, Houston.

28-29 Independent Natural Gas Association of America, Shamrock Hotel, Houston.

Sept. 30-Oct. 2. American Association of Petroleum Geologists, Mid-Continent regional meeting, Masonic Building, Wichita.

OCTOBER

1- 2 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

6- 7 Texas Mid-Continent Oil and Gas Association Rice Hotel, Houston.

7- 9 National Association of Corrosion Engineers, south central region, Mayo Hotel, Tulsa.

8- 9 California Natural Gasoline Association, annual fall meeting, Ambassador Hotel, Los Angeles.

11-17 Oil Progress Week.

19-20 Independent Petroleum Association of America, annual meeting, Texas Hotel, Fort Worth.

22-23 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

26-29 American Gas Association, annual conference, Kiel Auditorium, St. Louis.

29-31 Rocky Mountain Oil and Gas Association, annual convention, Cosmopolitan Hotel, Denver.

NOVEMBER

3- 4 Society of Automotive Engineers, national diesel-engine meeting, Conrad Hilton Hotel, Chicago.

5- 6 Society of Automotive Engineers, national fuels and lubricants meeting, Conrad Hilton Hotel, Chicago.

5- 6 American Association of Petroleum Geologists, Pacific section annual meeting, Hotel Biltmore, Los Angeles.

9-12 American Petroleum Institute, annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

21 National Gasoline Association of America, regional meeting, Herring Hotel, Amarillo, Tex.

quality-controlled for your benefit

SPANG "CW"®
steel pipe

From the selection of raw material to the finished product, SPANG "CW" Steel Pipe is *quality-controlled!* Rigid metallurgical control during the manufacture of SPANG "CW" assures uniform pipe with many on-the-job advantages. SPANG "CW" is a line pipe that is easily cut, easily bent, and easily threaded for faster installation at lower cost. Add the long service life of SPANG "CW" in the field, and you have line pipe of unequalled quality.

Why not take advantage of SPANG "CW" Steel Pipe on your next piping job? Whether it is to be an oil-gathering system, water system, gas line, air line, water flooding line or a salt water disposal line . . . *quality-controlled* SPANG "CW" will give you more service at less cost.

Specify SPANG "CW" Steel Pipe by name at your nearby National Supply Store, where it is normally available in a complete range of standard sizes.

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NATIONAL OIL FIELD MACHINERY AND EQUIPMENT
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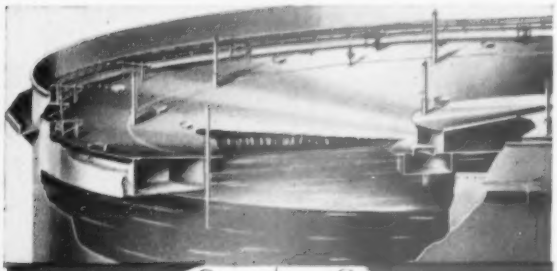
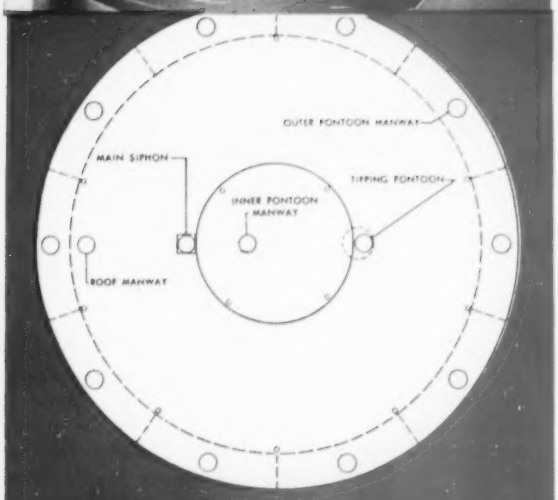
THE NATIONAL SUPPLY COMPANY NSCO NATIONAL BLUE PRODUCTS

the important factors in **floating roof design**

number 2 of a series





Multiple gas-tight pontoon compartments for safety . . .

Floating roof pontoons must be divided into a large number of roomy, gas-tight compartments for safety. Then, dangerous concentrations of vapor can't collect and the explosion hazard is reduced to an absolute minimum.

Deep roomy compartments, easily accessible, assure ample working space for economical and thorough maintenance and inspection.

Only the Wiggins Floating Roof pontoons have no internal cluttering framework which hampers maintenance and inspection.

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Triple Seal Protection

- Exclusive primary, secondary and top seals conserve more vapors than those of any other type floating roof

Pontoons

- Deep and roomy, uncluttered with framework—for easy inspection, maintenance and repair

Drainage

- Complete, clean drainage assures protection against peeling of paint, rusting and dangerous accumulation of water

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- Special Wiggins design gives optimum strength with the least amount of precious steel—better than normal safety factor

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GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South La Salle Street • Chicago 90, Illinois

THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Statue Trouble

HAVE you ever been in the position of wanting something for a long time and then not knowing what to do with it after you got it? Then breathe a sigh for Earl Sneed, long-time independent oil producer of Tulsa. He has a bear by the tail, or, to be more exact, a statue by the guy wire.

Sneed's fertile brain and promotional zeal have been responsible for such civic and industry betterments as the International Petroleum Exposition, the Petroleum Club of Tulsa, and the still embryonic National Oil Museum. Another one of Earl's agitations has been for the erection, somewhere in or near Tulsa, of a monumental statue of The Driller, in honor of the profession which created Oklahoma's leading industry and laid the foundations for the growth of his home city.

Now, as everyone knows who attended or saw pictures of the Oil Show, there was a big statue of a driller there—65 ft. high and glittering gold from tin hat to tiptoe. And—guess what—Unit Rig & Equipment Co., which built the statue for its display, has now donated it to Earl Sneed.

So at last Earl has his statue. But there are a couple of catches to it. In the first place, it isn't solid gold, or even bronze the way a proper statue ought to be; it's made out of papier mache splashed on chicken wire draped on a telephone pole; and covered with gilt paint. In the second place, Earl has to get it out of the I.P.E. grounds and put it up in an appropriate place.

Earl has located a fine site near the Tulsa end of the new toll road to Oklahoma City, but now there's a question whether it might so astonish transient motorists as to constitute a serious traffic hazard. Then there's the problem of who's going to pay for moving Mr. Driller, and who's going to keep his papier mache hide in repair against the ravages of the not-always salubrious Oklahoma climate.

So Earl is finding out that all is not gold that glitters. But being an independent oil man, his resourcefulness and energy are not to be discounted. He figures that if he can get his eye-filling temporary statue erected on a prominent temporary site it will create so much interest that eventually it will be replaced with a permanent statue on a permanent site. We'll bet that Earl finds a way to do it eventually, but at the moment he's in the same fix as a Siamese king with a stable full of white elephants.

Up vs. Down

WELL, the British finally have climbed Mt. Everest and can brag that they have stood 29,002 ft. above sea level. Everybody knew they wouldn't find anything of interest or importance up there, and the only reason they themselves could give for the feat was "because it's there."

The American oil industry has drilled 20,521 ft. below the surface, and within a few years it may go 29,002 ft. in the opposite direction from Mt. Everest. There are plenty of sedimentary basins known to be at least 30,000 ft. deep, and some are suspected to lie perhaps 60,000 ft. down. But oil men aren't going to drill them just because they're there. If oil wells are ever drilled as far down as Mt. Everest is up, it will be because there is good reason to believe that oil will be found at the bottom of the hole.

Probably nobody knows how much money has been spent in trying to climb up 29,002 ft., but we suspect it would be enough to finance drilling at least one well that far down. Mountain climbers have no new horizons to conquer, but oil drillers have plenty.

Dry Holes

A CORPORATION with the title of Dry Holes, Inc., domiciled in Houston, was issued a charter by the State of Texas on May 14. We thought such a company existed only in cartoons and in apocryphal yarns of the oil industry, but there it is, right on the official records. Don't ask us what the new company's business is; maybe it's out to get some of that dry-hole money we've heard about.

Henry D. Ralph

BAKER

offers 3 ranges of

Hinge-Lok Casing Centralizers

...to provide ample all-around cementing space for all casing programs, regardless of varying hole sizes or conditions.

"REACH" (Bowed Height) IS THE VITAL FACTOR All Baker HINGE-LOK Casing Centralizers have greater reach (or bowed height) of springs in corresponding ranges than any other casing centralizers on the market. Increased reach means adequate, all-around cementing space, even though the hole size may vary considerably from the drill bit size.

WHY REACH IS NEEDED In oversize sections of open hole, centralizers with insufficient reach frequently fail to contact the wall of the hole and thus perform no work. As a result, adjacent centralizers above and below can be so overburdened that casing-to-wall contact is apt to occur. The end result is likely to be a poor cement job at any such point of contact.
The increased *reach* of Baker HINGE-LOK Casing Centralizers ensures that each centralizer will contact the wall of the hole within its range and will contribute its share toward an effective centering job.

MAXIMUM STRENGTH The engineered bow shape of the centralizer springs provides *greater landed centering force* than can be obtained from any other available hinge-type centralizer covering the same range of open hole sizes.

YOUR CHOICE OF THREE RANGES Choose the bowed height of spring best suited to meet the centering problem of your specific program. (See description of ranges, below.)

EXTRA FEATURES

- *HINGED FOR EASY MOUNTING*
- *ALL SPRINGS WORK TOGETHER*
- *UNLIMITED ROTATION OF CASING*
- *EASY STARTING WITHOUT SNUBBING*
- *ALWAYS PULLED—NEVER PUSHED*

BAKER MODEL "H" Hinge-Lok Casing Centralizers

20-RANGE
Product No. 9112
For LESS-THAN-NORMAL CLEARANCE where no problem of over-size or irregular hole is anticipated.

25-RANGE
Product No. 9113
For NORMAL CLEARANCE, where no serious problem of over-size or irregular hole is anticipated.

SUPER-RANGE
Product No. 9114
For GREATER-THAN-NORMAL CLEARANCE or where extensive hole irregularities are anticipated in otherwise normal clearance.

Call Baker for Centralizer Service

BAKER OIL TOOLS, INC. HOUSTON • LOS ANGELES • NEW YORK

Runs are the key to a sound price structure

NOW that the 25-cent increase in the price of crude oil has been accepted by all purchasers, there is a general disposition to assume that the new price level is secure and that the industry can lay plans to operate on this new plateau more or less indefinitely.

It's not necessarily so. Prices of practically everything are determined, in the long run, by the market. In the case of crude oil, the price ultimately reacts to the supply and demand of refined products.

This is unfortunate for the producer who believes that cost of production should determine the price of crude, but it is an inescapable fact and the industry must live with it. In order to keep the price of crude in line with its production cost, the volume produced must be no greater than the quantity the market will absorb at that price. If the market becomes flooded, the prices will most certainly fall.

THE softest element in the oil-price structure today is refinery runs. They have been high for months, and recently as high as at any time last summer when maximum output was needed to make up for the strike in May. Consumption has not kept pace with output and as a result, stocks of all major products are high.

It costs money to carry excessive inventories for long periods, and if this situation continues, some day somebody will unload at distress prices. This could start a chain reaction which would break the market and bring all prices, including crude, down below the cost of production.

It is not unreasonable to ask refiners to cut their runs to a level more in line with current market demands. One reason for the excess crude-producing capacity in this country is the Government's request for it as a national defense measure. This is also a reason for excess refining capacity. If producers must carry reserve capacity for national defense, refiners must, too.

BUT the whole responsibility is not on refiners. Stocks of crude also are very high. As long as refiners are carrying big inventories they can hardly be blamed for converting crude into products. And as long as crude is produced above market demand for products, pipe lines will move it and refinery storage will be jammed.

So it takes some statesmanship by all elements of the industry to accomplish the delicate adjustments needed to balance supply with demand in order to maintain a stable and compensatory price structure.

Refinery runs should be cut back appreciably, and soon. But crude supply, both domestic and foreign, must also maintain a realistic relationship to the stocks situation.

This 11½ x 12 ft. Ni-Hard Lined Rod Mill replaced 2 sets of 74" x 20" rolls with accompanying screens and conveyors for handling lead and zinc sulphide ore at the Sullivan concentrator of THE CONSOLIDATED MINING & SMELTING COMPANY OF CANADA LIMITED. (Balls placed to show size and spacing of liners are 3" in diameter.) This mill, which operates with a 76-ton charge of 3½" rods and is designed to handle 400 tons of ore per hour, is a product of the HARDINGE COMPANY, INC., York, Pa.

Four-years' service indicates 6,750,000-ton life for Ni-Hard liners in world's largest rod mill

Performance Records Prove It: NI-HARD® *provides abrasion-resistance at lowest ultimate cost...*

And the reason? With a matrix resembling that of fully hardened steel, this moderately priced nickel-chromium white cast iron is the most abrasion-resistant product of the foundry industry.

Shown in the Hardinge Rod Mill, above, are the original Ni-Hard shell and discharge end liners. The end liners are still in use and after four years of milling approximately 8,000 tons of ore per operating day, it is conservatively estimated that their total life will approximate 6,750,000 tons. The shell liners were replaced after a life of 5,700,000 tons. The probable total consumption for both shell and end liners will reach the extremely low figure of 0.010 pounds per ton.

Take steps, now, to save labor and cut maintenance as well as operating costs by using Ni-Hard for your equipment parts subject to wear and abrasion. Our wide practical experience, gained over the past 20 years in the Ni-Hard field, is available to help you determine *whether or not* Ni-Hard is the best answer to your particular needs. Send us details of your problems for our suggestions. Write us now.

At the present time, nickel is available for the production of Ni-Hard and other alloys containing nickel, for end uses in defense and defense-supporting industries. The remainder of the supply is available for some civilian applications and governmental stockpiling.

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Dept. 20, 67 Wall Street, New York 5, N. Y.

Please send me free booklets entitled: "Engineering Properties and Applications of Ni-Hard" and "Buyers' Guide for Ni-Hard Castings."

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*City*_____ *State*_____

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

THIS WEEK

PRODUCTION.—New pre-Permian strike in northeast Andrews County expected to intensify search for deep oil in West Texas. . . . Discovery is Anderson-Prichard Oil Corp. and J. C. Barnes, Midland, 1-E University, which flowed at a daily rate of 3,353 bbl. from the Devonian. . . . ¶American Trading & Production completes prolific Cambrian discovery in Nolan County, West Texas. . . . Well potentialed 857 bbl. daily. . . . ¶Carter Oil vice president predicts Montana production will climb to 58,000 bbl. by 1956—well over twice the state's output in 1952—and reach 77,000 bbl. daily by 1960. . . .

GOVERNMENT.—Senate passes bill setting up machinery for oil operations in Continental Shelf. . . . Bill provides for same severance taxes levied by abutting states, but with money going to federal Government. . . . ¶Justice Department to ask Supreme Court review of trial court decision holding Phillips Petroleum to be a natural-gas company. . . . Request made by FPC, whose ruling exempting Phillips was invalidated by the trial court. . . . ¶J. A. LaFortune sworn in as head of PAD to replace J. Ed Warren June 30. . . . ¶Creation of a gas-advisory council similar to the NPC is advocated by existing council, which now operates under a government chairman. . . .

ONE OF THE BIGGEST barge shipments of line pipe ever made is shown here as it was accumulated at Greens Bayou, near Houston. The shipment, nearing completion last week, consisted of 211 miles of 20-in. pipe, about 100 miles of which is shown in this aerial view. The pipe was moved to the Greens Bayou staging grounds from the plant of A. O. Smith Corp. and barged through the intercoastal canal 369 miles to Harvey, La., for delivery to Southern Natural Gas Co. for construction projects in Alabama and Mississippi. For details on the shipment, see page 129.

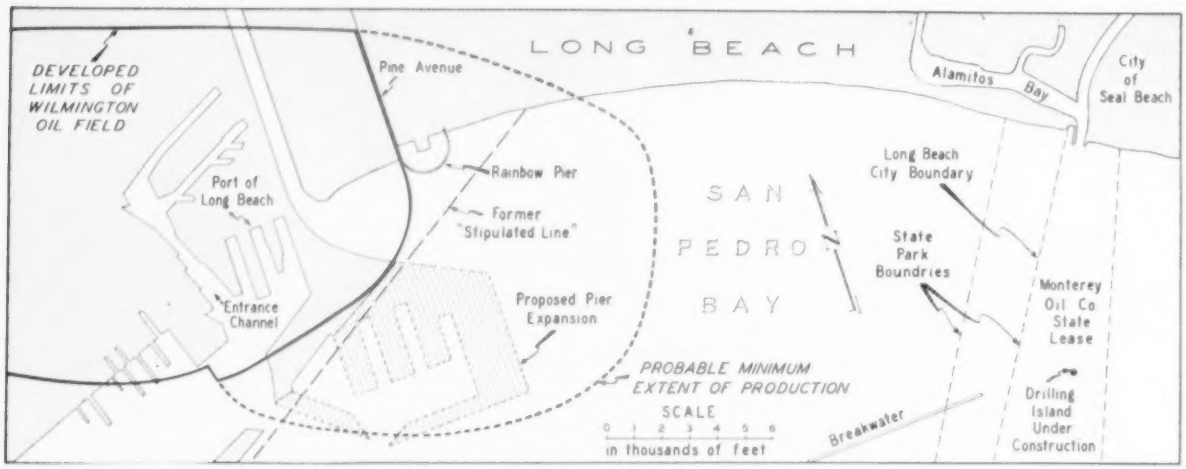
INTERNATIONAL.—Aminoil's Wafra 5, confirmation test of discovery well in the Saudi Arabia-Kuwait Neutral Zone, the Wafra 4, tops Burgan sand at 3,620 ft., finds water at 3,693 ft. . . . Company president Davies says well will be a producer but a "relatively small" one. . . . Drilling continuing to test lower Burgan zone formations. . . . ¶Colombia's favorable policy toward private oil development expected to continue under new government. . . . ¶World production of crude oil in April totaled 12,803,200 bbl. daily, down slightly for the fourth consecutive month, Journal survey shows. . . . Sharp drop in U. S. output largely offset by gains in the Middle East.

REFINING.—Cut in runs of 400,000 bbl. daily asked by Ernest Thompson, chairman of Texas Railroad Commission. . . . Lower rate of operations, coupled with cut in imports, needed to insure stability in industry next year, he says. . . . ¶Modernization and expansion planned by Cooperative Refinery Association for Phillipsburg, Kans., refinery. . . . ¶Pan American Refining issued certificate of necessity for 25,000-bbl. refinery in New Jersey. . . . ¶OEEC reports European refining capacity climbing at a rate higher than anticipated. . . . Output in 1954 expected to average 1,724,000 bbl. daily. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,459,925 bbl. daily for week ended June 20, down 8,400 bbl. daily. . . . ¶Total well completions for the week gained 20 wells to 995, the highest level this year. . . . ¶Wildcat completions were up 26 wells to 238 for the week. . . . ¶Rotary rigs operating in the United States decreased one rig for week ended June 22 from the revised total of 2,651 for June 15. . . .

TRENDS.—Refinery runs averaged 7,089,000 bbl. daily for the 3-week period ended June 20 or 264,000 bbl. daily more than the June average last year which also was higher than normal because of the product inventory reduction during the refinery strike. . . .

PRICES.—Creole raises price of higher-gravity Venezuelan crudes by 25 cents a barrel, marking first break in foreign structure following domestic increase of same amount. . . . Wolverton announces in Washington his committee will conduct a hearing to look into the crude and product price increases. . . . Says he has had "many protests." . . . Oil Marketers' counsel asks Justice Department to investigate antitrust aspects of price hike and present any evidence it finds of collusion to a grand jury. . . .



UNDEVELOPED RESERVES of Wilmington field lie within dotted line extending well out into San Pedro Bay. At lower right is the location of the controversial drilling island started by Monterey Oil Co.

Long Beach's Oil: How to Get It?

Drilling islands may provide means of producing reserves thought to exist in offshore extension of Wilmington field

D. H. Stormont

LONG BEACH.—When and how will the City of Long Beach undertake development of the oil reserves believed to underlie its submerged lands in San Pedro Bay?

Neither question can be fully answered at this time, but it is thought likely that large man-made islands and existing fills in the Harbor area will largely provide the drill site. From these structures wells then will be slanted to the desired bottom-hole location.

Plans have been made by the Long Beach Harbor Department to start development shortly of portions of already granted parcels which extend beyond the now-discarded "stipulated line." Development of new parcels, however, probably will not start within the next year.

Actions of the Long Beach City Council since the return of the city's oil tidelands point to thorough study before any bids are asked. It turned down offers of oil companies and voted for its own seismic survey in the yet uncharted area lying inside the breakwater and southeast of the Wilmington field's developed limits. This cannot be done until some time this fall, after the fishing season closes.

In the meanwhile the council and the Harbor Department will decide numerous questions about how the huge area is to be developed. These will include the form and scope of the development contract to be let, size of parcels, and whether they will be granted on an areal basis or by fault-block, and how reserves underlying downtown Long Beach can best be handled to avoid subsidence due to oil withdrawals.

How much oil . . . Most-quoted figure as to the size of the reserve lying inside the extension of the city's eastern boundary is 1,000,000,000 bbl. of oil. While all data point to a huge reserve, actually the amount is yet to be determined.

As is shown by the solid line on the accompanying map, development has been kept landward of the stipulated line—the boundary beyond which title was in question until the recent congressional action. How much farther southeast production extends is unknown.

The dashed line shows what is considered by some engineers to be the probable minimum limit of production. This was arrived at through relatively rapid closure of the Ranger zone's productive limits. Of the other six productive pays in the Harbor area, only the Tar and lower Terminal are believed to be productive beyond the line, and these for only a short distance.

That the Wilmington anticline extends farther southeast was indicated by an aerial magnetometer survey conducted about 2 years ago. This outlined an interesting anomaly extending beyond the eastern boundary of the city-owned submerged lands.

A deep zone already is known to be productive about 4½ miles southeast of the Harbor area. It was proved in 1947 by a directed well drilled by Monterey Oil Co. from an upland site and bottomed near the drilling platform shown 1½ miles offshore from Seal Beach. About 12,000 ft. of hole was made in drilling to a vertical depth of 5,400 ft.; horizontal displacement was approximately 9,600 ft.

The sands being produced at the Monterey lease are believed to correlate with the Ford zone in Wilmington field. Because of the flat angle of approach, whether or not the shallower Terminal, Ranger, and Tar sands are productive could not be determined. Monterey hopes to evaluate these zones and deeper prospects in three wells to be drilled from the off-shore structure.

The island originally was planned for completion about the first of this year, but no work has been done since last October because of litigation. The City of Seal Beach in lower court was upheld in its claim that a city building permit was required and that an anti-drilling ban was being violated. The case now is pending before the Circuit Court of Appeals.

Development contracts . . . As is the case in the parcels being developed by Long Beach Oil Development Co. and Richfield Oil Corp., any drilling in the

new area will be on a straight contractural basis.

Parcels are to be offered for competitive bidding and, according to Councilman Ray Keeler, "the operator who offers the city the greatest return will get the bid." In the case of Richfield's Parcel A granted in 1947, the city realizes about 94 per cent of the net profits. For its services as contract operator the company receives 6 per cent, plus the right to purchase the produced crude.

It is anticipated the contracts for new parcels will contain terms not present in those of Richfield and L.B.O.D. Because of damage which might result from subsidence in the downtown and beach areas, immediate starting of pressure maintenance with either gas or water or both might be required. Clauses relative to uniform well spacing and withdrawal of fluids, to eliminate the formation of subsidence pockets such as was caused by heavy production of wells in the vicinity of the Entrance Channel, likewise may be included.

Right of the city to unitize with other operators also probably will be included, provided Long Beach voters grant its officials such power in a special election to be held this fall. Still another new practice may be to grant parcels solely on a fault-block basis, eliminating the expense of duplicate lines and tanks which usually occurs when an areal basis is used.

How developed . . . Earth-filled islands, each capable of holding the facilities for 400 or 500 wells, probably will be used to tap the yet-untouched reserves. Two or three such structures, each covering about 10 acres and costing approximately $2,000,000, would be sufficient to develop all city-owned submerged lands inside the outer harbor breakwater. They could be placed so that they would not interfere with navigation.

Construction of the proposed port expansion shown on the accompanying map is regarded as unlikely. Thus these facilities would not be available for drill sites.

A special problem is posed by the reserves underlying Long Beach east of Pine Avenue, estimated to extend over 500 acres. Effort is being made to have the approximately 1,800 property owners form a community lease. The area then could be drilled by slant holes from a near-shore island. Or Rainbow Pier could be filled and the seaward portion used as drill sites. As the Ranger there lies as a subsea depth of about 3,600 ft., holes could be deflected 4,000 ft. or more horizontally without undue difficulty.

Bill May Draw Veto

SACRAMENTO, Calif.—The California Legislature adjourned June 10 after having passed only one bill relative to offshore drilling and leasing—and that one might be vetoed by Gov. Earl Warren.

This legislation, the Tomlinson bill, prohibits drilling in submerged lands where it might impair beach recreational or residential areas. The State Lands Commission opposed the bill as useless duplication of provisions of the Public Resources Code. Failure of Governor Warren to sign the bill within 30 days after adjournment of the legislature would constitute a pocket veto.

Probably the most controversial bill of the several proposed during May was withdrawn by its author because of lack of interest. The measure provided, among other things, that the state would have the power to condemn upland sites to provide space for drilling slant-hole wells into the submerged lands.

More Wildcats, Fewer Finds

LOS ANGELES.—California operators have drilled more wildcats but have made fewer discoveries during the first half of this year than they did during the first 6 months of 1952.

The nearly complete record for the first half of 1953 indicates that about 330 wildcats will have been completed, compared with 288 during the first half of last year. New discoveries apparently will be about 10 fewer than the 46 registered up to last July 1.

Total development and wildcat wells were expected to reach about 1,270, or approximately 40 more than last year's figure. That the average well depth increased was indicated in 6-month footage figures, an estimated 5,513,000 ft. as compared with 5,182,000 ft. last year.

Seismic Bids Rejected

LONG BEACH.—Bids of General Petroleum Corp., Richfield Oil Corp., and Standard Oil Co. of California to undertake an immediate seismic survey of the city's submerged properties inside the San Pedro Bay breakwater have been rejected by the Long Beach City Council.

Instead, the city will contract directly for a survey, probably to be started in October at the close of the fishing season. The State Fish and Game Commission forbids offshore shooting during summer months.

The three-company group was all prepared to start shooting. If the proposal had been accepted the survey would have been completed by June 19, expiration date of the state permit held by the group.

When the three-company offer was refused, Richfield's vice president, William Travers, said that his company alone would underwrite the entire cost of the survey. All information obtained would be made available to other prospective bidders and to the city. The proposal also was turned down by the council.

No seismic work has been done to determine oil possibilities inside the breakwater and southeast of existing production. Operators in the area had little doubt that Willmington field extends further southeast, at least insofar as Ranger zone production is concerned. The only question is whether it, or other Wilmington pays, will be productive as far southeast as the eastern city limits—approximately 4 miles distant.

ROCKY MOUNTAIN

Montana Outlook

Quick development seen for state by Carter executive

YELLOWSTONE PARK, Wyo.—Montana's oil production, which averaged 26,500 bbl. daily last year, will jump to 58,000 bbl. daily in 1956 and possibly to 77,000 bbl. daily in 1960, according to H. F. Moses, vice president of Carter Oil Co.

But Montana's quick growth is subject to several possible deterrents, Moses told the fiftieth annual convention here of the Montana Bankers Association.

Leases in the state are less attractive than federal or fee leases, since a sliding-scale royalty ranging from 12½ to 25 per cent discourages exploration on state lands, Moses said. Also, the penalty of $2 per acre per year beginning with the third year for failure to drill, in addition to the 75-cent rental, is double that of other areas, he said.

The state's growth also is subjected to maintenance of a fair tax structure, Moses said, pointing out that the average per-barrel crude-oil tax in Montana is 22 cents, compared to 8 in Wyoming, 14 in Utah, and 16 in Colorado.

About half the area of the state is prospective oil land, Moses declared, saying that of the 50,000,000 acres lying in the most favorable area east of the Front Range of the Rocky Mountains about 20,000,000 acres are now under lease. To adequately appraise and develop Montana's oil potentialities, he added, will require drilling of 4,900 wells and extensive exploration work over the next 8 years at an overall cost of $800,000,000.

Oil-Price Developments

Creole boosts price of Venezuelan crude; in Washington one committee schedules hearing, antitrust probe is asked

THERE were three principal developments last week growing out of the 25-cent per barrel boost in crude-oil prices in all areas outside California and the Penn-Grade area.

...Rep. Charles A. Wolverton of New Jersey announced his commerce committee would hold a hearing on the price situation July 1.

...Creole Petroleum Corp. announced a general increase for Venezuela crude oil, marking the first break in foreign crude prices.

...A demand that the Justice Department investigate the antitrust aspects of the increases in both crude and products prices was made by Paul E. Hadlick, general counsel of the National Oil Marketers Association.

Hadlick charged that the price boosts have all the earmarks of "collusion among the large oil companies controlling the oil markets."

"Raises in the price of gasoline . . . followed by advances in crude oil prices and again by additional increases in all grades of refined products, indicates clearly that there is collusion among the large oil companies controlling the markets," Hadlick said.

"Stocks of petroleum products are the highest in history and can be amply added to by simply lifting the oil states' rationing schedules," he asserted.

Hadlick asked that the department "promptly institute an investigation to determine if the antitrust laws have been violated and, if our suspicions are justified by the facts, that they be placed before a federal grand jury."

Venezuelan price up . . . The first open break in foreign crude-oil prices came early last week when Creole issued a new bulletin raising its higher-gravity crudes by 25 cents.

Creole, as the leading producer in Venezuela, sets the pace for the Caribbean area, and the other operators generally follow its prices.

The company's new bulletin No. 5 effective June 23 increased all crudes of 30° gravity or more by 25 cents except for Cumarebo crude, of 48.0°-48.9° gravity, which was raised by 30 cents. All heavier crudes were increased by 10 cents except for Lagunillas Heavy, which was left unchanged at a flat price of $2.05 a barrel.

Early last week none of the Persian Gulf producers had announced higher prices for Middle East crude following the general 25-cent increase in the United States. An increase for Caribbean crude had been generally anticipated *(The Oil and Gas Journal, June 22, page 142).*

With higher Caribbean prices established as a result of Creole's new bulletin, some observers felt this paves the way for higher Persian Gulf prices if they are to come at all. All marketed Middle East crude is 31° gravity and above.

Creole's prices are those at which it buys or sells Venezuelan crude in cargo lots. Purchases made by the company which are not subject to contracts with the government are made at the posted price less 1 cent a barrel. The usual 2-cent differential per degree of gravity holds for all except the flat-price Lagunillas Heavy.

Hearing scheduled . . . Wolverton said his committee had received "many protests" about the increases in gasoline and oil prices, which he pointed out came on the heels of a crude price raise in the Southwest.

"Inasmuch as these price increases follow a period of successive cutbacks in the amount of domestic production allowed and come at the very time that stringent reduction of oil imports is being urged, our committee proposes to inquire into just what the situation may be and to attempt to develop the facts or conditions with reference to such price increases," Wolverton said.

Synthetics Plant Shut Down

BROWNSVILLE, Tex.—Operations have been suspended for an indefinite period at the Carthage Hydrocol, Inc., synthetic-fuels plant here.

Company officials said additional equipment is needed to obtain capacity production at the $40,000,000 project and the company cannot at this time say when such equipment will be available or when the plant will again start up.

The Brownsville installation is designed to produce approximately 6,000 bbl. daily of synthetic gasoline, 900 bbl. of gas oil, 200 bbl. of fuel oil, and 300,000 lb. of water-soluble oxygenated chemicals. The plant was designed to process a feed of 90,000,000 cu. ft. of natural gas daily and use 280,000 cu. ft. of air to produce the oxygen necessary for the synthetic process.

A nearby plant of Stanolind Oil & Gas Co. which obtains a feed stream from the Carthage Hydrocol plant to produce alcohols, esters, acids, and ketones still was operating last week and was expected to continue until it exhausted current stocks, probably not before mid-July.

A second nearby plant, that of U. S. Industrial Chemicals, Inc., which packages and markets materials produced by the Stanolind plant, was expected to continue operations at least as long as the Stanolind plant operates.

Gas Forecast

Industry to spend nearly $4 billion during 1953-56

NEW YORK.—Almost $4 billion will be spent during the 4-year period 1953-56 by the gas-utility and pipe-line industry for new facilities and plant expansion, according to the American Gas Association.

The A.G.A. estimates an actual outlay during the period of $3,977 million, compared with expenditures of $4,686 million during the 4-year period 1949-52.

Nearly half of the total to be spent, $1.9 billion, will be devoted to transmission facilities; a third, $1.4 billion, will go for distribution facilities; the remaining $637 million will be spent for production, underground storage, and other facilities, according to the A.G.A.

In a comprehensive report of gas-industry expenditures, the association noted that the industry for the third consecutive year spent more than a billion dollars in 1952 on construction of new facilities. Last year was below the peak year of 1951, but the A.G.A. noted that many applications for new pipe-line projects were deferred because of difficulties in obtaining pipe and delays in rate-case settlements.

This year the industry is expected to spend nearly $1.4 billion, making 1953 the second largest year in history for gas-industry expenditures. Of this total, $809 million is expected to be spent in extending existing transmission lines and building new ones. Distribution facilities are expected to require an outlay of $347 million. For the past 4 years, the association noted, the gas industry has added an average of 902,000 customers a year.

Underground storage this year will require an estimated $38 million, nearly double the $20 million believed spent

World's First Propane-Operated Locomotive

Most powerful locomotive unit in the world is the distinction given to this unit by Union Pacific Railroad, which recently completed successful tests using propane to fuel the turbine-electric locomotive. The 276-ton locomotive delivers upward of 4,800 hp.—more than three diesel units operating together—and in recent tests handled a 79-car train of 4,650 tons. Application of propane, carried in a special pressure tender, is the result of joint research by Union Pacific, Richfield Oil Corp., and General Electric. The railroad plans to place this and similar locomotives in regular freight service between Los Angeles and Salt Lake City. The present turbine is geared down for a top speed of 65 m.p.h. but is considered suitable for high-speed passenger trains. Operating efficiency and maintenance economy were given as the reasons for experimenting with propane. Stationary engines have operated as long as 30,000 hours without repairs, railroad officials say.

last year. During the next 4 years, the A.G.A. said, expenditures for underground storage are expected to total $134 million, compared with $42 million forecast only a year ago for the same period.

Construction outlay by the manufactured, mixed, and liquefied petroleum gas utilities are relatively small, the A.G.A. said. Estimates by this group "reflect proposed conversions" by several companies to natural gas, it added.

Stanwell Control Acquired

NEW YORK.—Blair Holdings Corp. revealed last week that it has acquired control of Stanwell Oil & Gas, Ltd., for $1,100,000 and all capital stock in Blair Oil & Gas Corp., a Blair Holdings subsidiary.

Stanwell, a Canadian independent, holds leases, together with Canadian Gulf Oil Co., on 13,600 proven and semiproven acres in the Erskine area of central Alberta. The firm also has acreage under lease in the Lindbrook-Tofield, Stony Plain, Sibbald, Big Valley, Leduc, and Redwater-Bruderheim areas, all in Alberta.

Blair indicates it will dedicate $2,000,000 to development of the Stanwell properties.

Blair properties include interests in more than 225,000 acres in Texas, Mississippi, Alabama, Florida, and Georgia, according to E. J. Evans, president of Blair Oil & Gas.

Several Civil Suits Pending

NEW YORK.—Several civil lawsuits filed by the U. S. Department of Justice against major international oil companies are now pending in federal District Court in New York.

One case naming five American companies as defendants and alleging an international "oil cartel" was recently transferred from Washington to New York. The other cases, which are unrelated, ask for recovery of certain alleged overcharges on ECA and MSA-financed shipments of Saudi Arabian crude oil. Through an error, these later suits were incorrectly identified with the so-called cartel case in the headline of an article in *The Oil and Gas Journal, June 15, page 83.*

Fracturing Process Licensed

TULSA.—Stanolind Oil & Gas Co. has licensed seven service companies to offer its formation-fracturing process, according to E. F. Bullard, president.

The process now has been used to treat more than 25,000 wells. It has been successful on about four out of five wells, increasing production of the successfully treated wells on an average of about 75 per cent, Bullard said.

The companies now holding licenses include Halliburton Oil Well Cementing Co., Dowell Incorporated, The Western Co., Cardinal Chemical, Inc., Producers Chemical Service, Acid Engineers, Inc., and Texas Acidizers, Inc. Stanolind expects to issue licenses to other firms soon.

Industry Briefs

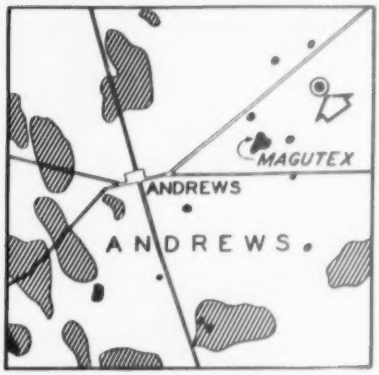
AUSTIN.—Designation of the Benedum Spraberry as a field separate from Spraberry Trend Area field in West Texas has been asked by Plymouth Oil Co. A hearing on the request will be held by the Texas Railroad Commission here July 16. Benedum, once considered a separate area, was included in the Spraberry field last year. Separation would remove Benedum from the effects of field-wide Spraberry orders.

BATON ROUGE.—Louisiana's July allowable has been set at 699,063 bbl. daily. The figure is 1,199 bbl. higher than that of June and was increased by this amount to take care of new production, Conservation Commissioner John B. Hussey said.

OKLAHOMA CITY.—The Oklahoma Corporation Commission last week set the state's July allowable at 519,260 bbl. daily, unchanged from June. Purchasers' nominations were 483,518 bbl. and the Bureau of Mines forecast of demand was 535,000 bbl. daily.

AUSTIN.—Hearings open June 29 before the Texas Railroad Commission here on Humble Oil & Refining Co.'s plan for unit operation of Fort Chadbourne field, Runnels County. Production in the field was resumed earlier this year after a year's shutdown, ordered by the commission pending installation of equipment to eliminate flaring of casing-head gas.

OKLAHOMA CITY.—Oil companies paid out more than $130,000 in bonuses to the Oklahoma School Land Commission for oil and gas leases on 55 tracts totaling about 4,772 acres in the state's most recent auction of leases on school lands here. Top bidder was Skelly Oil Co., which paid $12,443.20 for each of five tracts and $11,993.30 for two additional tracts in Texas County on the western side of Guymon-Hugoton gas field.



PROLIFIC new Devonian discovery in Andrews County is indicated on map by hollow arrow. Cross-hatched areas are Pennsylvanian or deeper.

Pre-Permian Strike

Reworked dry hole in new area tests 3,353 bbl. daily

MIDLAND.—The search for deep oil in West Texas has resulted in another pre-Permian discovery in northeast Andrews County and a record-size potential from an old Permian exploration that was dry and abandoned on its original attempt.

Anderson - Prichard Oil Corp. and J. C. Barnes, Midland, 1-E University rated a whopping 3,353-bbl. daily completion gage when it flowed 838.23 bbl. of oil on a 6-hour test.

The new well is a Devonian strike and is producing from 53 ft. of saturated pay section. It was drilled to the Ellenburger and flowed up to 40 bbl. of oil an hour from that formation but water cut in and could not be eliminated. Operators then plugged back to the Devonian.

Location is some 6 miles northeast of Magutex field, which has both Devonian and Ellenburger oil, and south of Devonian production in Block 5 and Block 6 pools.

Offset operators include Continental Oil Co., at 1 University, which last week was drilling near the basal Permian, and J. R. Sharp, Inc., 1-A University, which has recovered oil on one test of the Devonian and is now drilling in Ellenburger limestone. Anderson-Prichard also has two wells going, one of which is near the testing stage. *(For details, see Area Field Reports.)*

Bids on Leases Requested

Bids for oil and gas leases on three parcels of land totaling 954.51 acres in the Lake McClelland Park in Gray County, Texas, will be opened by the Bureau of Land Management July 22.

Leases will be awarded to the qualified bidders of the highest cash bonuses at the usual rental and royalty rates.

The leases offered cover 462.57 acres, 453.64 acres, and 38.30 acres, respectively. The Government owns all of the mineral rights in these parcels except one-half of one-eighth royalty reserved for former owners.

Allowables by Districts Set

AUSTIN.—The Texas Railroad Commission has set Texas production allowables by districts for July 1.

The following table compares these district allowables with those of June 1. *(For other information on Texas July allowable see The Oil and Gas Journal, June 22, page 150.)*

ALLOWABLE PRODUCTION IN TEXAS
(Thousands of barrels daily)

	July 1	June 1
Dist. 1	44,144	42,667
Dist. 2	163,426	161,409
Dist. 3	496,106	483,531
Dist. 4	274,330	269,845
Dist. 5	53,045	51,717
Dist. 6 (outside East Texas)	134,977	128,567
East Texas field	249,456	257,718
Dist. 7-B	152,238	145,854
Dist. 7-C	194,685	182,902
Dist. 8	996,534	963,475
Dist. 9	248,153	237,022
Dist. 10	95,979	94,727
Total	3,103,073	3,019,434

Lease Sale Records Broken

AUSTIN.—All former records for high bids for oil and gas leases on University of Texas lands were smashed June 19 at the university's most recent lease sale here.

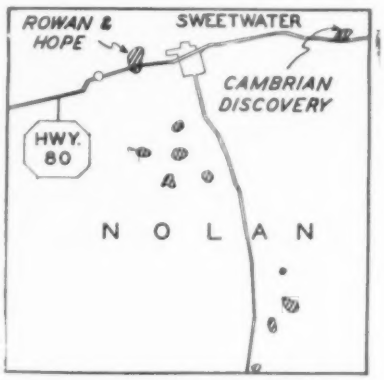
Bidders laid out a whopping total of $16,238,000 for 144 of the 145 leases taken—almost double the former high total of $8,856,000 set last December.

The former high bid for rights on a single block also was surpassed substantially when Continental Oil Co. paid $2,150,000 for 2,275 acres in northeastern Crockett County in West Texas. The tract is 10 miles south of Barnhart field and 3 miles west of Midway field. In all, Conoco paid $6,259,500 for five blocks of more than 2,500 acres each, all in Crockett County.

The second high bid, $2,000,000 for a 2,560-acre block 6 miles south of Todd field, also was made by Conoco. Drilling to 8,000-9,000 ft. must be undertaken within 6 months on all five tracts.

Phillips Petroleum Co. paid out $1,300,000 for 2,612 acres in Reagan and Crockett counties. The company must drill to 11,000 ft. this year. It took several smaller leases in Andrews County.

Other high bids for acreage in Andrews County were made by Forest Oil Corp. and Monterey Exploration Co., $975,000 for 2,574 acres, and by Stanolind Oil & Gas Co., $775,000 for a similar block.



SECOND CAMBRIAN SAND DISCOVERY along the archipelago of buried granite peaks running north and south near the eastern sites of Coke, Nolan, and Fisher counties, made a flush producer on completion test.

Cambrian Well Tests 857 Bbl.

SWEETWATER, Tex. — American Trading & Production Corp. has completed its 1 Little as the second Hickory sand (Cambrian age) well in West Texas, and for a record potential of 857 bbl. daily.

The discovery lies on the northwest flank of White Flat multiple-pay field in Nolan County. Its pay section is unusually thick for Cambrian wells, having 198 ft. of oil-saturated sand above the water. Completion potential was based on an actual 16-hour flow test of 571.28 bbl. of 46° oil through 32/64-in. choke from perforations near the top of the section at 5,454-78 ft.

Early this year Humble Oil & Refining Co. completed its 3 Butner as a Hickory-Cambrian well in North Bronte field of northeast Coke County. Completion potential was 301 bbl. daily from pay at 5,541-53 ft. Previous to that the only other Cambrian oil in West Texas was in Pecos County, which has since been depleted.

American Trading 1 Little made a dual completion in the Strawn, one of the regular pays in White Flat field, through perforations at 5,074-5,100 ft. Potential was 442 bbl. of oil a day through 32/64-in. choke.

NEWEST TOOL in the North is this development of Imperial's which will traverse soggy marshes and rivers as well as dry land. It's designed for year-round oil operations in a country that's frozen solid in winter and nearly impassable in summer.

Muskeg Beater

Year-round transportation over formidable but promising Canadian terrain promised by Imperial's unusual vehicle

EDMONTON, Alta. — Imperial Oil, Ltd., believes it has solved the problem of transportation for exploration parties in Canada's 400,000 sq. miles of muskeg country.

The answer is a 14-ft. boat-like amphibious vehicle called the "Muskeg Crawler" and is the result of 4 years of experimentation by Imperial's geophysical engineers.

The muskeg country is a region of bush, swamp, and meandering streams during 7½ months of the year. Only during 4½ months when the terrain is frozen solid can conventional vehicles operate in the area.

Horses have been used successfully in the area for exploratory operations, but the slowness of this method prompted Imperial to experiment with both commercial and military vehicles in an attempt to find a better answer to the problem.

The Muskeg Crawler, so successful in tests it has been licensed for commercial production, is an all-track unit with a bearing weight of less than 2 psi. Power is transmitted to the tracks separately, with individual and simultaneous control of tracks in both forward and reverse. It can float, can carry a pay load of at least 2,000 lb., and has a maximum effective speed of 16 m.p.h.

The unusual vehicle is a composite of the good feature of most equipment used in northern Canada. It uses an all-hydraulic drive with steering accomplished by differential power control. Most radical departure from conventional equipment is the hydraulic system. In place of the usual mechanical drive, the unit diverts the engine power into two separate hydraulic pump and motor systems. This means of power transmission enables each track to be driven independently of the other, with full range of power both forward and reverse in each track.

Tracks of the crawler are 24 in. wide. Each runs of four sets of dual 4.50 by 16 tires and is returned on three small idler wheels. Since each track has 96 in. of its length on the ground, total ground contact is 5,000 sq. in. Total gross weight of the vehicle is 9,500 lb., resulting in a ground pressure of about 1.9 psi., which allows the crawler to cross terrain considerably softer than that required to support a man walking.

Imperial believes the crawler will open thousands of square miles of muskeg country heretofore virtually inaccessible to the oil industry's exploration men.

AREA MADE MORE ACCESSIBLE by the Muskeg Crawler is this vast expanse of Canada beginning not far north of Edmonton and extending well past the Arctic Circle.

New Pipe-Line Firm Formed

TORONTO.—Sun Oil Co., Ltd., and Canadian Oil Compaines, Ltd., have worked out an agreement by which Canadian acquires a one-third interest in the 200-mile, 8-in. Sarnia-to-Toronto product pipe line now under construction by Sun.

The agreement, announced jointly by the two companies, also provides for the organization of a new company, Sun-Canadian Pipe Line Co., Ltd., to complete construction and to operate the line. Main offices will be at London, Ont.

Completion of the $6,000,000 line is scheduled for about the first of October—also the date set for completion of Sun's new refinery at Sarnia. It will carry products from the Sun plant and Canadian Oil Companies' refinery at

Sarnia. Initial capacity will be 17,500 bbl. daily, with an ultimate capacity of 35,000 bbl. daily possible with additional pump stations. The line initially will have a single station at Sarnia.

Sun Oil Co., Ltd., is the Canadian subsidiary of Sun Oil Co., Philadelphia. President of Sun-Canadian Pipe Line will be William C. Kinsolving, who will also continue to serve as president of Sun Pipe Line Co., a wholly owned subsidiary of Sun Oil, Philadelphia.

On the Sun-Canadian board will be Kinsolving; Clarence H. Tew and Douglas Robinson, both of Canadian Oil Companies; John C. Agnew, Sun Oil; Birney K. Morse, Sun Pipe Line; and John Blair Moffett, Sun Oil.

The new products carrier will eliminate the two company's dependence upon Great Lakes transportation, providing an all-weather, year-round outlet.

Refinery Expansion Set

BONNYVILLE, Alta. — Bonnyville Oil Refineries' new 1,000-bbl. topping plant here has been found to be too small to handle climbing production in the Bonnyville-Cold Lake area, and its capacity will be expanded a minimum of two and one-half to three times.

Fish Engineering Co., Houston, which recently completed a study of the plant, recommended that facilities be added to produce jet fuel, diesel oil, asphalt, Bunker C, gas oil, and naphtha.

Bonnyville Oil Refineries' is owned jointly by Tri-Tor Oils, Ltd., and Tor American Oils, Ltd.

Meanwhile, Tri-Tor Oils is expected to launch construction soon of a natural-gas line to Cold Lake, Alta., site of a government airport project. The company has a contract to supply the area with 3 to 7 million cubic feet of gas daily for 10 years.

Group Buys Caliph Control

VANCOUVER, B. C.—A controlling interest in Caliph Petroleums, Ltd., has been acquired by a group of Vancouver and Beverly Hills, Calif., business men.

Purchasers are reported to include Jacob P. Harper, Harper Engineering Co.; George A. Richardson, president of Trans Era Oils; A. Mona, Mojon Oil, Ltd., and A. A. Mercola, Beverly Hills financier.

Caliph has 470,000 acres under lease in the Dawson Creek field area of British Columbia and a 160-acre farmout in the Golden Spike area near Edmonton, Alta. The company currently is carrying on development operations in both areas.

Caliph also has an 80-acre lease in Maidstone field in Alberta with seven producing wells and four locations.

New Grease Plant Opened

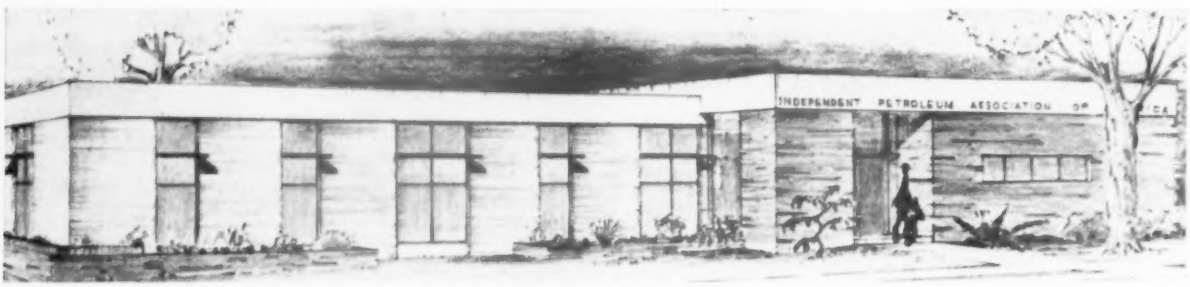
CLARKSON, Ont.—A new $1,500,000 grease plant capable of producing 15,000,000 lb. of products annually has been completed by British American Oil Co., Ltd., at its refinery here.

The new plant will reduce to a large extent Canada's importation of grease from the United States.

A full range of greases will be manufactured from a variety of saturated and unsaturated fats and fatty acids, to be purchased in Canada. Naphthenic lube oils will be supplied by the company's Montreal refinery, and the Clarkson refinery will provide paraffinic stocks.

Incorporating the most modern equipment and processes for producing a full range of greases, the plant is considered the best in Canada and one of the most modern in the world. Raw stocks, with exception of some naphthenic oils from Montreal, will originate from Canadian crudes.

MID-CONTINENT



ARTIST'S SKETCH of new I.P.A.A. headquarters building as it will appear when completed next January.

New I.P.A.A. Building

Ground broken for national headquarters of association

TULSA.—Ground was broken here June 25 for a new building to house the national headquarters of the Independent Petroleum Association of America.

Construction is scheduled to get under way about July 10, with the building to be finished and ready for occupancy next January.

It will be an L-shaped one-story building located just outside the Tulsa business district in an area rapidly developing as an oil-headquarters center (*The Oil and Gas Journal, June 22, page 152*). It will be finished in pink Colorado quartzite stone and gray face brick.

Containing 10,000 sq. ft. of floor space, it will have 7,400 ft. of office space at ground level and 2,600 ft. in a partial basement. The entire building will be air-conditioned.

A building committee, appointed from the I.P.A.A. membership to plan the new headquarters, was headed by Fred W. Shield, San Antonio, Tex., a past president of the association.

However, most of the spade work was done by a three-man subcommittee of Tulsans. D. R. Snow, retired Sunray Oil Corp. official, headed the subcommittee, with F. A. Kirkland of Kewanee Oil Co., and C. E. Buchner, I.P.A.A. executive manager, as members.

The I.P.A.A. had its headquarters in Tulsa since 1930, shortly after its organization. It was in a downtown office building until 1949 when it acquired and remodeled the former residence of J. E. Crosbie, early-day Tulsa oil man, for office purposes.

Skelly Oil Co. subsequently acquired the present I.P.A.A. property and in the exchange sold the association the site for its new building.

Flood Being Expanded

ALLEN, Okla.—Sunray Oil Corp. will add 105 acres this summer to its 85-acre water flood in its Lucy Harjo

lease in Allen field in Pontotoc County.

The company began a 20-acre pilot project in 1951 and expanded it to 85 acres in 1952. Production from the 50-year-old lease has climbed from 14 to about 200 bbl. daily since initial waterflooding operations were undertaken. Average depth of the field is 725 ft.

NATIONAL AFFAIRS

Offshore Bill Passed

Senate measure calls for management of federal portions of submerged oil lands under tax laws of abutting states

Bertram F. Linz

WASHINGTON.—Holders of oil and gas leases in the outer or federal Government portion of the Continental Shelf would be required to pay the severance or production taxes imposed on upland production by the abutting states, but the money would go into the national Treasury under legislation passed by the Senate last week.

To have their state-issued leases validated as federal leases under the proposed act for federal management of the submerged lands, oil companies would be required to pay into the federal Treasury any state severance taxes accruing since June 5, 1950, and not already paid to the state. On that date the Supreme Court handed down its decisions in the Texas and Louisiana tidelands cases.

Payment of the production taxes also would be required on future production from these leases and from any leases issued henceforth, under provisions authorizing the Secretary of the Interior to fix the terms on which leases would be made.

The production-tax requirements would affect initially only operators holding leases issued by the state of Louisiana, since there is not as yet any production off Texas.

Any production taxes paid in the past to the state would be retained by the state, and the federal Government would make no effort to recover them. But any tax which has not been paid would have to be paid to the federal Government. In no case would the operator be required to pay a second time, that is, to both the state and the federal Government.

With the 12½ per cent base royalty, operators in submerged Gulf of Mexico lands would be paying between 18 and 19½ per cent in royalties and production taxes.

The provision for collection of back taxes was adopted to prevent any operator who may not have been paying the tax from benefitting from a "windfall." Most operators, however, have been making their production tax payments to the state, it was indicated.

Change of pace . . . Faced with broad problems of constitutional law, the Senate Interior Affairs Committee, in writing the measure, dropped the proposal to apply the federal maritime laws to the submerged lands. Instead it was determined to make applicable the whole body of federal law which now applies to those areas inside the states owned by the federal Government and under exclusive federal jurisdiction.

As part of this provision, the committee stipulated that the laws of abutting states should become a part of the federal law within areas opposite the states, but all laws will be administered and enforced only by federal officers and courts.

Even under this combination of statutes, members of the committee expressed doubt that all of the legal problems had been solved, but it was felt a start should be made somewhere and the applicability of the various laws to the specific circumstances of submerged-lands operations be determined as questions arise.

Bidding basis . . . Under the bill as introduced, the Secretary of the Interior would be authorized to grant oil and gas leases on the basis of bonus bids. Royalty would be not less than 12½ per cent, and leases could "contain such rental provisions and other terms and provisions as the Secretary may prescribe at the time of offering the area for lease."

All oil and gas leases would cover a compact area not exceeding 5,780 acres and would be for 5 years and as long thereafter as oil or gas were produced in paying quantities or drilling or well-reworking operations approved by the Secretary were carried on.

LaFortune Takes PAD Reins

WASHINGTON.—J. A. LaFortune, 59, Tulsa, executive vice president of the Warren Petroleum Corp., was sworn in June 23 as the third head of the Petroleum Administration for Defense.

As deputy petroleum administrator LaFortune will succeed J. Ed Warren, who took over the post as head of PAD at the end of May 1952. Warren has resigned, effective June 30, and will leave almost immediately for a vacation in Europe.

LaFortune was appointed by Interior Secretary Douglas McKay on the endorsement of the National Petroleum Council's committee on PAD personnel and a broad and representative group of industry leaders.

A native of South Bend, Ind., and an alumnus of Notre Dame, LaFortune has been vice chairman of Warren Petroleum since 1952. He joined the company in 1924 after experience in the accounting department of Standard Oil Co. (Ind.) at South Bend, in newspaper and periodical advertising, and as assistant secretary of the Mid-Continent Oil and Gas Association. He has made his home in Tulsa since 1919.

Phillips Appeal Set

High court to be asked to decide gas-company issue

WASHINGTON.—Supreme Court review of the District of Columbia Court of Appeals decision in the Phillips Petroleum Co. case is expected to be sought by the Department of Justice before the court reconvenes in October.

A request that this action be taken was made to the department by the Federal Power Commission, whose ruling that Phillips was not a natural-gas company within the meaning of the Natural Gas Act was invalidated by the lower court *(The Oil and Gas Journal, June 1, page 60).*

The case is of broad interest to the natural gas industry since it involves the basic issue of whether producers and gatherers of natural gas are to be brought under FPC control. Legislation to keep the commission out of this field already has been introduced in Congress but in view of the short time remaining before adjournment no action will be sought immediately, and nothing may be done until the Supreme Court has ruled on the issue.

Trade Agreement Attacked

WASHINGTON. — Unsuccessful in their efforts to secure quota limitations on oil imports, members of Congress from the coal-producing states have launched an attack on the Venezuelan reciprocal trade agreement.

Legislation was introduced last week

WATCHING WASHINGTON

Bertram F. Linz

Economists Eye Price Hikes

Government economists are watching for the results of the recent price increases in the oil and steel industries, but there is little expectation they will be the signal for a general price raise and a new inflation.

Most of the business indicators are against any broad upward move in prices. In many lines, some difficulty is being experienced in maintaining present levels.

The raise in posted prices for oil is admitted by most economists to be long overdue. The increase in steel was the direct result of wage hikes. Thus, the two industries have well-based reasons for their action.

It is generally believed that if there is any trend toward higher prices it will not be the result of these increases but of other factors in the situation.

For several months, a number of indices have been soft, apparently due to uncertainty over the results of steps taken by the administration to reduce government spending and, more recently, the prospects of a truce in Korea.

Government officials seem to see nothing startling in recent price developments and feel that the law of supply and demand is coming back into operation and will take care of such situations.

Seasonal-Demand Worry

The heavy decline in products demand this spring has focussed the attention of refiners on the increasingly seasonal character of the oil industry.

Second-quarter demand, east of California, is expected to be about 937,000 bbl. daily less than first-quarter requirements. The Petroleum Administration for Defense figures that from now on the range between the high demand of the two winter quarters and the low demand of the two summer quarters will be 900,000 bbl. daily or more.

There were suggestions in the PAD report that this will call for seasonal adjustments in operations, but many refiners take the position it would be far less costly to increase storage capacity.

Under such a plan, refineries could be operated at a relatively constant level throughout the year, with excess distillate production in summer going into storage which could be used again in winter to hold any excess gasoline output.

It is pointed out that it costs anywhere up to 10 times as much to provide refinery capacity for a given volume of production as it would to provide storage capacity for it.

The past few winters have been mild and have not overstrained production facilities although there was a temporary shortage of heating oils on the East Coast in the 1951-52 winter.

Since the end of the war there has been a considerable increase in storage capacity, and refiners say it would not require too much further increase to provide a buffer stock. But they admit there are some problems in the way, one of them that of maintaining prices when large stocks have accumulated.

FTC Changes Position

Under Republican management, the Federal Trade Commission has changed its position on the issue of basing-point pricing.

A majority of the commission now believe it is not an unfair practice for sellers, acting independently and in good faith, to meet the lower price of a competitor or to sell at delivered prices and adsorb freight charges.

The commission's new views were made known in a letter to the Senate judiciary committee opposing a bill sponsored by Sen. Estes Kefauver of Tennessee which would bar "good faith" as a defense.

The commissioners taking this position are the new Republican chairman, Edward F. Howrey, Lowell B. Mason, and Albert A. Carretta. Commissioners James M. Mead, former chairman, and Stephen J. Spingarn still cling to the view that such practices are unfair and illegal.

The House judiciary committee is now considering a number of bills to legalize competitive practices but it is not expected that any legislation will be enacted this year.

by Sen. Matthew M. Neely and Rep. Cleveland Bailey of West Virginia to nullify those provisions of the agreement relating to the import-tax rate on residual fuel oil.

Bailey charged that former President Truman exceeded his power in reducing the rate to 5¼ cents per barrel, and that the legal rate should be 10½ cents.

The lower rate, Bailey asserted, costs the Treasury $26,250 daily in import taxes.

Gas Council Advocated

WASHINGTON. — Creation of a gas-industry group similar in setup and scope to the National Petroleum Council was urged upon Interior Secretary Douglas McKay last week by the Gas Industry Advisory Council.

Council members took the position that a better job of industry-government cooperation could be done and needed studies made by an all-industry organization. The council has been under a government chairman and its activities severely limited by Justice Department restrictions.

Regardless of the form of setup, however, the industry representatives held that the council should be continued at least so long as the defense production act is in effect and the PAD is maintained.

In a talk before the council, McKay gave assurance that there would be no attempt by the Interior Department or the Eisenhower administration to control the end use of fuels to aid the coal industry, as has been suggested.

Tanker Contracts Let

WASHINGTON.—Contracts for the operation of 62 government-owned tankers for a 2-year period beginning July 1 have been awarded to 4 American tanker-operating companies by the Military Sea Transportation Service.

The contracts, on a self-financing, cost-plus-fixed-fee basis, will require the contractors to man and operate the naval "in service" tankers assigned to MSTS in overseas transportation of petroleum products for the Armed Forces.

The four operators were selected on the basis of bids for the contracts received from 21 operators. Three of them have held MSTS contracts in the past.

The contracts went to the Marine Transport Line, New York, for operation of 16 tankers; Mathiasen's Tanker Industries, Inc., Philadelphia, 15 vessels; American-Pacific Steamship Co., San Pedro, Calif., 14 vessels; and Joshua Hendy Corp., San Francisco, 17 vessels.

Flood Popularity Up

Western Kentucky's 35 sandstone, 6 limestone floods now account for over 15 per cent of area's total oil output

LEXINGTON, Ky. — An increasing comprehension of the reserves recoverable by water flooding in the Kentucky area has prompted oil operators in the region to flood more and more acres and to practice better reservoir engineering methods in drilling for primary oil.

Water-flood operations now account for 15.4 per cent of the daily oil production in western Kentucky.

Ten counties are the principal producers: Butler, Daviess, Hancock, Henderson, Hopkins, Muhlenberg, Ohio, McLean, Union, and Webster. Here average daily production is 25,800 bbl., of which 4,000 bbl. is produced by water-flood methods.

Ohio County, which is a major water-flood producer, has a daily oil production of 3,500 bbl., 65 per cent of it water-flood oil.

The analysis was made by F. E. Moran, consulting engineer and geologist of Owensboro, speaking before recent meeting of the Kentucky Oil and Gas Association.

Moran reported that 35 sandstone floods and 6 limestone floods in the area now take in 5,100 developed effective acres. Gross water injected in these 41 projects totals 31,500,000 bbl. Current daily injection rate is 42,500 bbl.

Cumulative water-flood oil from the 41 projects is 4,400,000 bbl.; current oil production averages 4,000 bbl. daily. Ratio of cumulative injection water to cumulative oil is 7 to 1, and ratio of present water injected to present oil produced is 10 to 1.

Type of sands . . . The 35 sand projects on the average have permeability of 107 md. and porosity of 19.3 per cent. Sand thickness averages 18 ft. On 25 of these projects gross primary oil production totals 17,000,000 bbl. for 6,300 effective acres, or 150 bbl. per acre-foot.

Moran's study showed that spacing in the 35 sand projects averaged 5 acres for primary development, 6 acres for water-flood development. There are 720 producing wells with a current total output of 3,800 bbl. of oil per day (5.3 bbl. per well per day). There are 800 water-injection wells taking a total of 40,000 bbl. of water per day (50 bbl. per well per day).

Type of limestones . . . The six limestone floods have average pay-zone thickness of 8 ft. Primary oil production totals 1,750,000 bbl. for 980 effective acres, or about 1,800 bbl. per acre or 220 bbl. per acre foot.

Gross water injected totals 1,650,000 bbl., and current daily injection is 2,400 bbl.

Cumulative oil from these six limestone projects is 127,000 bbl., current daily oil production is 140 bbl. Ratio of cumulative injection water to total oil is 13 to 1, ratio of daily injection water to oil is 17 to 1.

The six limestone projects averaged 17½-acre spacing for primary, 40-acre spacing for water-flood development. There are 19 producing wells currently making 140 bbl. per day (7.4 bbl. per well per day). The 19 water-injection wells are taking 2,400 bbl. per day (125 bbl. per well per day).

ATTENDING THE THIRTIETH ANNUAL MEETING of the Pennsylvania Grade Crude Oil Association in Pittsburgh were, left to right, Clarendon E. Streeter, Bradford producer, retiring president; Merryle S. Bukeyser, International News Service, guest speaker; Charles A. Chipman, Boliver, New York, producer and new president of the association; and F. G. Cottle, Imperial Oil, Ltd., Toronto, Ont., and Canada's war-time deputy oil controller, another guest speaker.

Runs Too High?

Thompson says reduction of 400,000 bbl. daily needed

PITTSBURGH.—Refinery runs currently are 400,000 bbl. daily too high and imports are too high, and both must be cut to insure stability in the oil industry next year.

Addressing the thirtieth annual meeting of the Pennsylvania Grade Crude Oil Association here June 18, Ernest O. Thompson, chairman of the Texas Railroad Commission, said it is fortunate that importers "are indicating an intention to reduce imports into this country."

Cuts in the rate of refinery operations now, Thompson said, could mean that refiners "can be back to present rates . . . in the fourth quarter of this year." "Next year," he said, "oil stability can be well assured by reducing imports now and refinery runs now rather than later."

Research need cited . . . The need for an expanded research program aimed at arresting the decline in Pennsylvania's oil production was emphasized by John C. Calhoun, Jr., of Pennsylvania State College.

Calhoun noted that the state's production was down to 7,500,000 bbl. per year when water flooding was legalized, was up to 11,800,000 bbl. in 1929 when the research program at Penn State started, and in the 1937-39 interval reached a peak of 19,000,000 bbl. yearly. Since then, he pointed out, it has declined to 11,000,000 bbl. yearly.

Calhoun placed known reserves in the state at 140,000,000 bbl., but said the oil in place is about 2.5 billion barrels, meaning that "there is 20 times the oil in her secondary reservoirs than is acknowledged to be capable of production."

Pennsylvania's position, Calhoun said, can be altered by:

. . . Finding new primary reservoirs.

. . . Developing new techniques for producing the known oil in the ground.

. . . Applying the present techniques to a greater number of the 160 known reservoirs.

. . . Making present techniques cheaper to operate or the margin of profit greater.

Capacity Building Up

OEEC looks for potential output of Europe's refineries by end of 1954 to top expectations by 10,000,000 tons

EUROPEAN refinery expansion is progressing at a faster-than-anticipated rate and by the end of 1954 it is expected a potential annual output of 99,500,000 metric tons (approximately 1,990,000 bbl. daily) will be reached.

This estimate, made last week by the Organization for European Economic Cooperation, assumes, however, that the refineries will continue to be operated at abnormally high levels. This involves using obsolete units and disregarding the normal refinery production limit of about 90 per cent of potential capacity. Such operation was necessary in 1951 and 1952, following the shutdown of Abadan, but may not be economic in the future.

Actual output in Europe next year is expected to be 86,180,000 metric tons (approximately 1,723,600 bbl. daily), and inland demand is estimated at 78,600,000 tons (approximately 1,572,760 bbl. daily), leaving 6,542,000 tons (approximately 150,840 bbl. daily) for export.

The achievements of the European refinery industry over the past 3 years and the prospects for the future were recounted in the third report of the OEEC, released in Paris. It was the first review of the situation to be issued by the organization since August 1951.

Rapid expansion . . . By the end of 1952, the OEEC disclosed, throughput in the participating countries had practically attained the maximum potential level previously envisaged to be reached by this month, and by the end of this year it is expected to have exceeded this level by more than 10,000,000 tons.

"Europe now occupies an important place in world refining, her share rising from about 5 per cent before the war to about 13 per cent on January 1, 1953," the report commented.

This rapid expansion has been due not only to rising demand for products in the participating countries but also to the Iranian crisis and its consequences, it was explained. The latter presented a formidable problem of making up the 7,000,000 tons a year of products and over 4,500,000 tons of crude oil for which the OEEC countries had depended upon Iran. While the problem was met, it involved operating plant in a way which would not have been economic in normal conditions.

Eastern markets permanent? . . . With the closing down of Abadan, there was an unprecedented growth in exports from European refineries to destinations east of the Suez Canal, which the OEEC warned may pose a problem in the future.

In 1952, the report showed, about 4,000,000 tons of European products moved through the canal, of which about 1,500,000 tons was from France, 1,400,000 tons from the United Kingdom, and about 900,000 tons from Italy.

"The question which immediately arises," the OEEC pointed out, "is whether, when the new refineries now planned or under construction at Aden and in Australia and India come on stream during the next few years (even assuming that Abadan remains virtually immobilized), European refineries will still have an outlet east of Suez; and if not, whether these exports can be expected to find an outlet elsewhere. If operations were resumed at Abadan, the problem might arise even sooner.

"The answers to these questions lie beyond the committee's competence depending as they do on such extraneous factors as the growth of demand in

Forecast of Refinery Operations in 1954 by Countries

(All products—thousands of metric tons)

	Refinery operation through 1954	Plant capacity by end of 1954
Benelux		
Refinery production	14,566	15,633
Total demand	8,561	
Export potential	6,005	
France		
Total production	20,298	24,473
Total demand	14,589	
Export potential	5,709	
Germany		
Total supply	9,157	10,994
Total demand	7,655	
Export potential	1,502	
Italy, including Trieste		
Refinery production	12,755	16,790
Total demand	7,655	
Export potential	5,100	
Portugal		
Refinery production	600	993
Total demand	1,080	
IMPORT REQUIREMENTS	480	
Sweden		
Refinery production and shale	1,770	1,865
Total demand	5,680	
IMPORT REQUIREMENTS	3,910	
Switzerland		
Refinery production	190	.....
Total demand	1,414	
IMPORT REQUIREMENTS	1,224	
Turkey		
Potential refinery output		300
Total demand	948	
United Kingdom		
Refinery production and substitute fuels	27,624	29,120
Total demand	22,882	
Export potential	4,742	

the world generally and in the Indian Ocean area in particular, but the outcome will certainly be awaited with interest by European refiners."

Supply-demand gap . . . While there is a wide discrepancy between anticipated capacity and anticipated demand, the OEEC held that the balance of total output against consumption and exports is not an infallible guide to the amount of refining capacity needed in western Europe as a whole or in individual countries.

However, it does provide a rough and ready standard, so long as the structure and practice of the oil industry is borne in mind, OEEC said.

Companies not only plan capacity to meet demand for several years ahead, but, while the economies of different countries are subject to varying degrees of government control, the industry within that framework is highly competitive. Even if European refineries were devoted wholly to meeting European requirements "it would consequently be unrealistic to expect a precise balance between capacity and demand because companies are always keen to avoid dependence upon their competitors for supplies," the report said.

Another factor is the need of international oil companies for refining capacity somewhere for their crude production. While they first seek to locate their plants in the most economical way their decisions also are influenced by such matters as political and labor conditions. Likewise, because of the international character of the industry and the existence of competition, governments would not always find it desirable to eliminate imports even though, in theory, adequate refining capacity existed within their territory.

The total cost of the European refinery program over the period 1948-54 now is estimated at $1,391,000,000, as against an estimate in August 1951 of $1,018,000,000. Actual expenditure so far appears to be $980,000,000, with another $411,000,000 to be expended over the next 2 years. The dollar expenditure for the 6-year period is estimated at $173,500,000, of which about $30,000,000 is covered by American government grants or loans.

Cracking capacity . . . By the end of 1954, total cracking capacity in Europe, thermal and catalytic, is expected to reach 56,500 tons a day, compared with 18,900 tons at the beginning of 1951. This does not include Germany's present hydrogenation capacity of 3,575 tons daily, of which up to 2,800 tons a day is in use, with the reserve capacity to be brought into operation as market conditions warrant.

The expansion of cracking capacity is due largely to the erection of catalytic cracking units scheduled to go on stream this year and of which the capacity will reach 44,900 tons daily by 1955, approximately 1,100 tons more than anticipated in the OEEC's previous report.

However, it was pointed out, the proportion of catalytic cracking to distillation capacity is likely to be only 14 per cent, as compared with 34 per cent in the United States. Thermal cracking capacity also is much lower, 4 per cent as against 20 per cent. This is explained partly by the fact that European refineries have mainly been constructed since the development of catalytic processes and partly by America's high demand for gasoline in relation to heavier products.

Equipment situation . . . The report took the position that the point has now been reached where nearly all the equipment required by European refineries can be manufactured in Europe itself. Certain special apparatus and spare parts for existing equipment of American origin, however, must still be obtained from the United States, and there are instances where European delivery times are so long that refineries prefer to obtain their requirements elsewhere.

The rising demand for catalysts also has led to new factories being set up in some of the participating countries, and supplies from European sources should meet practically all demands in the near future. Other effects of the refinery-expansion program have been the establishment of petrochemical plants in a number of countries.

Imports still necessary . . . Despite the rapid expansion of the European refinery industry, there will continue to be a need for some imports, the OEEC held after surveying the situation.

In the absence of information about military demand and with the development of jet propulsion, it said, European refiners generally are reluctant to risk the heavy investment needed for the production of aviation gasoline.

Some difficulty is foreseen in the kerosine/gas-diesel range, also. Gas-diesel production in 1954 will be just sufficient to meet expected demand and there may be a deficit in kerosine. The amount of the shortage is seen as depending upon the requirements for jet fuel.

In the field of lubricants, however, Europe by the end of 1954 will have a capacity for about 2,500,000 tons annually. While the large number of different specifications in Europe probably will require imports of certain grades, they are likely to be balanced by exports of other grades.

Forecast of Refinery Operations in 1954 by Products

(Thousands of metric tons)

	Refinery operation through 1954	Plant capacity by end of 1954
All gasoline (except aviation)		
Refinery output	23,045	26,704
Internal demand	18,499	
Export potential	4,546	
Kerosine (including jet fuel)		
Refinery production	3,153	4,747
Internal demand	3,394	
Import requirements	241	
Gas-diesel oil		
Refinery production	17,576	20,420
Internal demand	14,953	
Bunker liftings	2,694	
Total demand	17,647	
Import requirements	71	
Fuel oil		
Refinery production	33,437	38,078
Internal demand	20,536	
Bunker liftings	9,097	
Total demand	29,633	
Export potential	3,804	
Lubricants		
Refinery production	2,248	2,542
Internal demand	2,413	
Import requirements	165	
All products		
Refinery production	86,180	99,468
Internal demand	78,638	
Export potential	7,542	

Production Down Again

Middle East gains offset sharp U. S. skid, holding drop in Free World's April crude output to 38,000 bbl. daily

Dahl M. Duff

PRODUCTION of crude oil throughout the free world dropped back in April for the fourth consecutive month.

The decline of about 38,000 bbl. daily was relatively small since a sharp decrease in the United States was largely offset by a continued rise in production from foreign fields.

In the Middle East, production soared to a new all-time record high as the total went above 2,400,000 bbl. daily for the first time. Most of the over-all increase in total foreign production was again accounted for by the Middle East.

Free, or non-Communist world production reached an all-time record last December of 11,708,700 bbl. daily. It fell steadily by small amounts in each of the four succeeding months. United States production was down every month except February and even then the increase was negligible.

Total free world production averaged 11,597,100 bbl. daily in April. This represents a drop of 111,600 bbl. daily from the December record. During that 4-month period, United States output declined 351,700 bbl. daily, or 5.3 per cent, to the April average of 6,282,000 bbl. daily.

Middle East surge . . . During the same 4 months, foreign production gained 240,100 bbl. daily, or 4.7 per cent, to 5,315,100 bbl. daily average during April. The dominant position of the Middle East in the increase is shown by the fact that its April output of 2,428,700 bbl. daily represented a gain of 336,600 bbl. daily, or 16.1 per cent, over December. Middle East production established successive new records each month from January to April.

As compared with April 1952, free world production in April of this year showed an increase of 227,100 bbl. daily, or 2 per cent. The United States was down 147,400 bbl. daily, or 2.3 per cent, during the 12-month period, while foreign production was up 374,500 bbl. daily, or 7.6 per cent.

Latin America . . . Venezuelan production, which in February and March was around 80,000 bbl. daily under the average for 1952, showed a small increase in April. The average was 1,744,600 bbl. daily, compared to 1,718,500 bbl. daily the previous month. Production in Venezuela by weeks during April was: week ended April 6, 1,755,800 bbl. daily; April 13, 1,742,300 bbl. daily; April 20, 1,759,300 bbl. daily; and April 27, 1,745,000 bbl. daily.

Available information indicates crude production in Argentina has risen by about 10,000 bbl. daily during the last few months and in April was nearly 80,000 bbl. daily. This increase apparently reflects new-field development from 1952 discoveries by Yacimientos Petroliferos Fiscales. Canadian production was up about 20,000 bbl. daily with the opening of shipping on the Great Lakes, and further sharp gains were anticipated during the ensuing summer months.

Crude production in Colombia at 112,800 bbl. daily was only slightly below the record 113,200 bbl. daily set the previous month. Production by operators in Colombia during April was: Shell, 47,502 bbl. daily; Empresa, 35,981 bbl. daily; Texas, 4,770 bbl. daily; and Colpet, 24,586 bbl. daily.

Europe . . . In Europe, another small gain in West Germany resulted in a new record of nearly 41,000 bbl. daily. West German output has been rising steadily for the last several years.

The largest single field in Europe, Schoonebeek, which accounts for all Netherlands' crude-oil production, averaged 16,300 bbl. daily in April, also a new record. Schoonebeek output was cut back in February because of the European floods.

Estimated crude-oil production in Russia and some of the smaller pro-

WORLD PRODUCTION
(In thousands of barrels daily)

Country—	Apr. 1953	Mar. 1953	Apr. 1952
W. Hemisphere:			
Argentina	79.0	78.3	66.2
Bolivia	1.5	1.4	1.6
Brazil	2.7	2.7	1.8
Canada	188.0	168.2	130.6
Chile	3.2	3.1	2.2
Colombia	112.8	113.2	107.6
Cuba	0.1	0.1	0.1
Ecuador	7.8	7.8	7.6
Mexico	206.3	215.8	218.1
Peru	45.0	42.4	45.3
Trinidad	61.0	61.0	57.2
Venezuela	1,744.6	1,718.5	1,829.9
Total	2,452.0	2,412.5	2,468.2
Europe and N. Africa:			
Algeria	1.5	1.6	0.7
France	6.8	6.7	6.7
Fr. Morocco	2.0	2.0	2.4
W. Germany	40.9	39.3	32.8
Italy	1.9	1.9	1.0
Netherlands	16.3	15.5	14.0
Egypt	47.0	47.4	44.5
United Kingdom	1.1	1.1	1.1
Total	117.5	115.5	103.2
Middle East:			
Bahrein	30.0	30.1	30.1
Iran	26.0	26.0	30.0
Iraq	568.9	559.3	302.2
Kuwait	858.0	771.0	783.0
Qatar	85.7	74.9	66.4
Saudi Arabia	859.5	804.2	878.7
Turkey	0.6	0.6	0.3
Total	2,428.7	2,266.1	2,090.7
Other Asia:			
British Borneo	93.0	101.9	106.7
Burma	2.5	2.5	2.2
India	6.0	6.0	6.0
Indonesia	200.0	185.2	149.1
Japan	5.9	5.7	6.0
New Guinea	5.0	4.9	4.6
Pakistan	4.5	4.5	3.9
Total	316.9	310.7	278.5
Total, non-Communist foreign	5,315.1	5,104.8	4,940.6
United States	6,282.0	6,530.9	6,429.4
Total, free world	11,597.1	11,635.7	11,370.0
Est. Russian & E. Europe:			
Austria (Soviet Zone)	60.0	60.0	50.0
Romania	80.0	80.0	80.0
Russia	1,035.0	1,035.0	935.0
Other Communist	31.1	31.1	26.2
Total	1,206.1	1,206.1	1,091.2
World total	12,803.2	12,841.8	12,461.2

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Completely current reports also are lacking for certain countries of Southeast Asia. Data for earlier months have been revised where necessary.

TREND OVER THE LAST YEAR

	W. Hemisphere less U. S.	Middle East	Total non-Communist foreign
1952—			
May	2,527.6	2,142.1	5,059.9
June	2,517.8	2,208.9	5,117.6
July	2,495.0	2,126.1	5,018.7
August	2,425.5	2,091.7	4,921.7
September	2,417.8	2,168.2	4,994.8
October	2,455.8	2,175.1	5,047.2
November	2,504.9	2,174.7	5,098.7
December	2,561.3	2,092.1	5,075.0
1953—			
January	2,472.8	2,252.3	5,152.2
February	2,407.2	2,258.4	5,096.8
March	2,412.5	2,266.1	5,104.8
April	2,452.0	2,428.7	5,315.1

ducing satellites in eastern Europe has been revised upward. The additional output attributed to eastern Europe is mainly in Hungary which is reported to have increased production from a new-field discovery.

Middle East . . . Two of the three main producing countries in the Middle East set new all-time records in April.

Iraq production at 568,900 bbl. daily was nearly 10,000 bbl. daily over March. The total included 467,800 bbl. daily from Kirkuk, 61,100 bbl. daily from Zubair, and 29,000 bbl. daily from Ain Zalah.

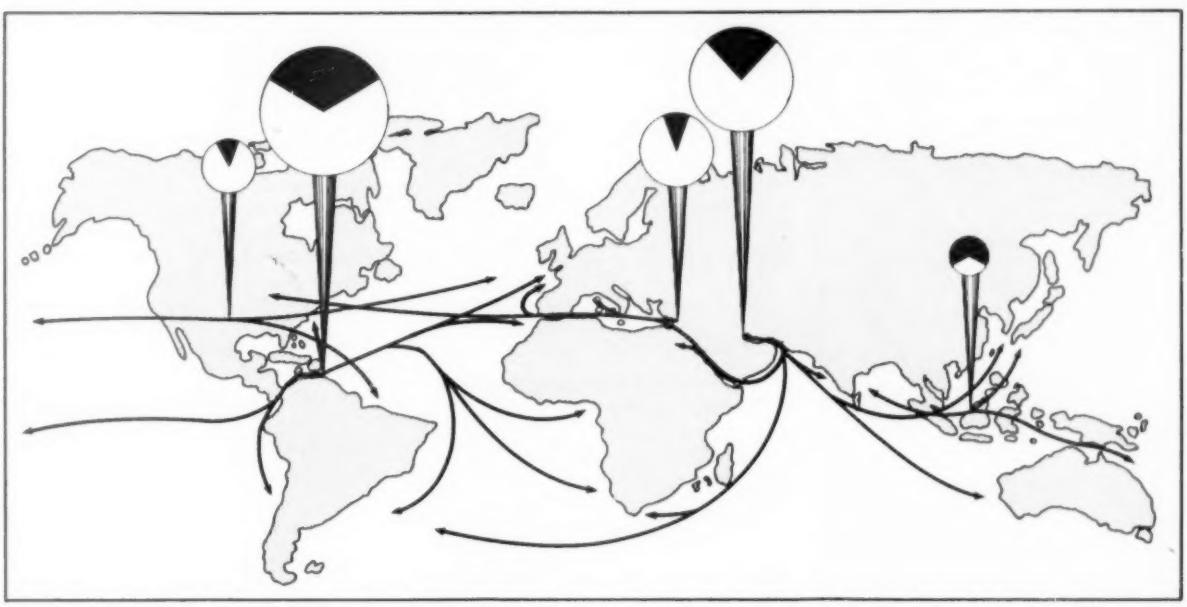
Production in Kuwait rose to 858,000 bbl. daily, an increase of 87,000 bbl. daily over March and nearly 48,000 bbl. daily over the previous record in July 1952.

Saudi Arabian production was up nearly 55,000 bbl. daily to 859,500 bbl. daily during April.

During the first 4 months of 1953, Kuwait and Saudi Arabia were neck and neck. Kuwait's production during this period averaged out to slightly above 808,000 bbl. daily. Saudi Arabia's output during the same period was 809,267 bbl. daily.

Another production record in the Middle East during April was in Qatar. This shaikhdom's output rose to 85,700 bbl. daily, slightly above the previous record of 83,700 bbl. last February.

Far East . . . In the Far East, reports indicated production in British Borneo, mostly from Seria field, was down in April as a result of safety measures taken when gas and mud erupted in two places in the field the latter part of the month. Production in Indonesia during April was estimated at 200,000 bbl. daily, of which about 45,000 bbl. daily was from Caltex's operation which went into commercial production last spring.



WHERE ROYAL DUTCH-SHELL GETS ITS OIL and where it goes are shown in this company-prepared illustration, which also provides an insight into the tremendous size of the Group's global oil operations. The circles represent the relative amounts of oil moved out of the world's principal exporting areas last year. The black portions represent Royal Dutch-Shell's share.

Shell Outlay Boosted

Giant organization says it spent whopping $526,000,000 last year in carrying out its world-wide oil operations

CAPITAL expenditures of the world-wide Royal Dutch-Shell Group last year amounted to approximately $526,000,000.

This sum went 51 per cent to exploration and production, 27 per cent to refineries and chemical plants, 16 per cent to marketing, and 3 per cent each to tankers and miscellaneous.

While total world consumption of oil products rose nearly 7 per cent during the year, crude and natural-gasoline production of this major international oil organization increased about 10 per cent, refinery runs more than 6 per cent, and sales approximately 11 per cent.

These and other figures on Royal Dutch-Shell activities are provided in the annual statements of the two parent companies, the British Shell Transport & Trading Co., Ltd., and the Dutch Royal Dutch Petroleum Co. The group's operations in the United States are through Shell Oil Co., Shell Chemical Co. and other subsidiaries.

The capital expenditures were up sharply last year. By contrast, the group spent the equivalent of about $459,000,000 in 1951. In that year, the group outlay on exploration and production was 54 per cent of the total. The lesser percentage spent on exploration and production last year was taken up in marketing, tankers, and miscellaneous.

Antitrust viewpoint . . . Sir Frederick Godber, Shell Transport & Trading chairman, in a review of the antitrust proceedings instituted by the United

States Government against a group of international oil companies, originally including Royal Dutch-Shell, said in the report:

". . . The American antitrust laws are peculiar unto themselves, and in no other country has legislation of this character been carried to such extremes. I mean by this that, although it may be generally accepted that abuses of the public interest by monopolies and other combinations of competitors are evil and there is legislation in some other countries to protect the public against such abuses, the American antitrust laws through progressive judicial interpretations go far beyond this concept; in fact, what may be a breach of the American antitrust laws can well be regarded as logical and prudent practice on this side of the Atlantic. It is necessary to understand this point in order to have a proper perspective of the action taken."

The reports briefly discussed group operations in the different parts of the world. Among these comments was the following information:

Exploration and production . . . The group and associated companies produced approximately 1,300,000 bbl. daily of crude and natural gasoline in 1952. Total supplies, including crude from long-term contracts, was about 597,000,000 bbl. compared with 549,000,000 bbl. in 1951.

Manufacturing . . . The Shell Group, world-wide, refined an average of more than 1,600,000 bbl. daily, and an additional 36,000 bbl. daily was blended directly into finished products. Because of the avgas shortage resulting from the shutdown of facilities at Abadan, Shell refineries increased output of this product by 60 per cent. Among other improvements, work was under way on construction of lube-oil facilities at Curacao in the West Indies and at Buenos Aires.

Transportation . . . By the end of the year, tonnage of owned and period-chartered vessels of the group amounted to 6,800,000 tons, up 500,000 tons during the year. The total length of trunk pipe lines belonging to Shell companies at the end of the year totaled about 14,500 miles. In Indonesia, a 60-mile, 10-in. line was laid from the fields to Pladju refinery, and in France, a 45-mile, 14-in. crude line was laid from Le Havre to the Petit-Couronne refinery.

Marketing . . . Though world-wide consumption of gasoline continued to expand, the considerable rise in the level of taxation on this product began to have a marked effect on consumption. In some countries, this increase in taxes has been especially steep. In Britain, for example, there was no increase in total consumption of gasoline last year, and compared with 1951, average consumption per vehicle dropped. Another result was to give impetus to the change from gasoline to diesel-engined road vehicles.

Research . . . Intensive research was continued at 12 research centers in the United States, Britain, and the Netherlands. In the geological field, new methods were studied for assessing not only age of particular types of rock but also their various changes. Corrosion of well casing induced by bacterial activity was brought under control. In refining, introduction of grid traps in distillation columns led to considerable savings in equipment cost and to an increase in processing capacity. At several plants, new equipment was being erected for lube-oil processing which would insure better mixing and settling of components during extraction.

MIDDLE EAST

Wafra 5 Finds Oil

But water level indicates small producer, Davies says

THE American Independent Oil Co.'s Wafra 5 in the Kuwait-Saudi Arabia Neutral Zone, first well drilled in since the discovery last March, encountered the top of the Burgan sand at 3,620 ft., but found water at 3,693 ft., according to company statements last week.

Drilling is continuing to determine if lower members of the Burgan zone are productive. Ralph K. Davies, Aminoil president, disclosed progress on the well in an announcement June 22. Two days later, he made a subsequent statement to correct what he said were unauthorized and erroneous reports being circulated with reference to the test.

"In the interests of accuracy, it should be pointed out that this will be a producer, but a relatively small one," he said. "It was anticipated from seismic information that this second well . . . would be somewhat lower on the producing horizon. The results obtained do not in the opinion of our geologists materially alter the prospects indicated by the discovery well."

The Aminoil president pointed out he had said last March that the full significance of the discovery must await the drilling of a number of additional wells to outline the field. "The position then taken remains unchanged," he said. "Development is going forward in the normal way without discouragement and with high hopes as to final results."

The well now drilling is approximately 2¼ miles from the discovery completed in March, and is being drilled to test the northwest flank of the structure. The discovery flowed at rates as high as 4,000 bbl. daily from the Burgan zone *(The Oil and Gas Journal, April 13, page 94, and May 4, page 85).*

Wafra 5 was spudded April 26, and previous reports indicated considerable coring was being carried out. Davies' announcement did not disclose what results were obtained by Wafra 5 in a section below 1,100 ft. where a heavy flow of low-gravity oil was obtained in the discovery. Gravity of the crude from the Burgan zone in the discovery well was 30°-31°.

LATIN AMERICA

Well Completed in Basement

Confirmed reports on P-86 in La Paz field in western Venezuela reveal that this well was deepened from 7,812 to 8,889 ft., penetrating a large section of the basement and resulting in an initial flow of 2,930 bbl. daily of 34°-gravity crude through a ¾-in. choke.

Previous reports indicate the well went through nearly 1,000 ft. of basement rock and obtained at least part of the production from fractures in this section *(The Oil and Gas Journal, May 18, page 227).* The operator is Shell Caribbean Petroleum Co., Ltd. The gravity of the crude is the same as that obtained in the regular Cretaceous limestone production in the field.

Policy Viewed as Unchanged

The existing friendly policy toward private foreign oil capital in Colombia is expected to continue without change under the new government of Lieut. Gen. Gustavo Rojas Pinilla who seized power recently in a bloodless coup.

The new cabinet of General Rojas included Pedro Nel Rueda Uribe as minister of mines and petroleum succeeding R. Noguera. The new oil minister is from Bucaramanga, the capitol of Santandar Province, and is reportedly interested in transferring the headquarters of the government company, Empresa Colombiana de Petroleos, to Bucaramanga.

As a result of several changes in the petroleum and other laws over the last 3 years, Colombia offers one of the best legal climates for private oil capital in Latin America. This liberal oil policy

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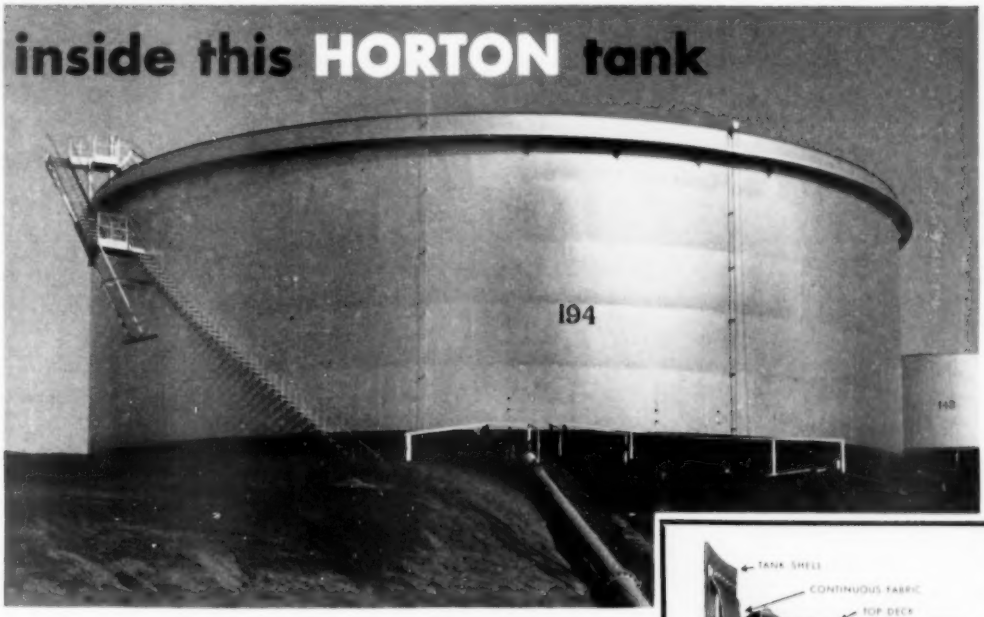

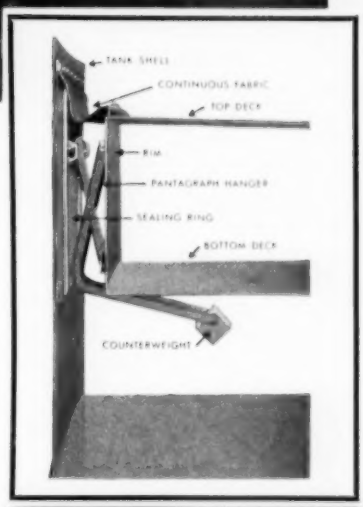

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Horton Floating Roofs are built in three types . . . Double-Deck, Pontoon, and Pan. The Horton Seal is standard equipment on all three. Further information or quotations may be obtained by writing our nearest office. There is no obligation on your part.

Top: 84,000-bbl. tank with a Horton Double-Deck Floating Roof at the Standard Oil Company of California's El Segundo, California refinery.

Center: View showing details of the Horton Seal.

Right: View of sealing ring and pantagraph hangers being assembled on a Horton Floating Roof under construction. When installation is complete, the lower arm of the hangers extend under the deck, not above as shown.

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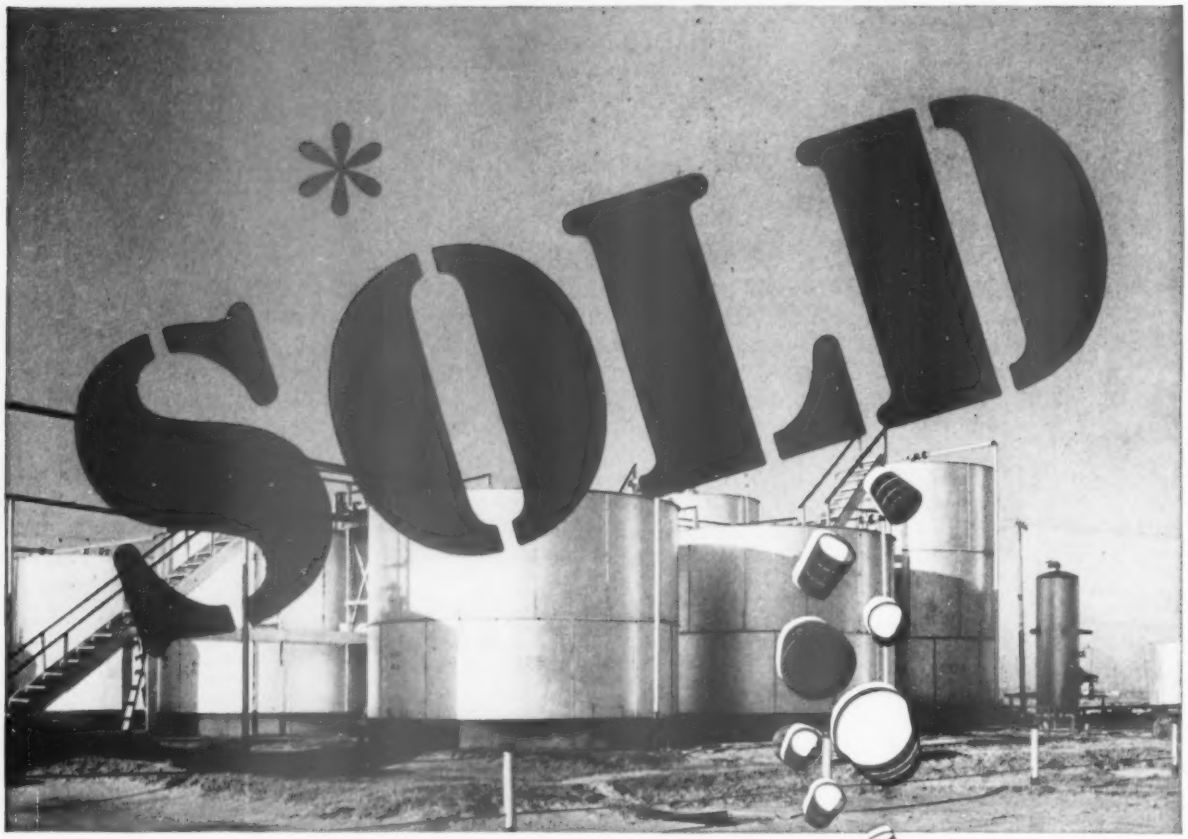

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is backed by the Conservative Party generally rather than by any one faction of it. For example, the changes in the petroleum law were first promulgated by decree by former President Opina Perez and later confirmed during the administration of President Urdaneta Arbelaez.

General Rojas with Conservative support took over less than a day after Dr. Laureano Gomez attempted to resume the presidency after a 19 months' illness. General Rojas said he acted to halt the "unconstitutional activities" of Dr. Gomez.

EUROPE

Dutch Test Successful

A flow of several hundred barrels daily is reported to have been tested in the Rijswijk exploratory well on the southeast edge of The Hague in the Netherlands.

Although there was no official information available on the test, geologists who follow European oil developments said the oil is probably coming from the Lower Cretaceous at depths below 5,000 ft. The operating company is Nederlandse Aardolie Mij (Royal Dutch-Shell and Jersey Standard).

If the Rijswijk production is confirmed, it would give the Netherlands its first oil outside Schoonebeek field on the German border in the eastern part of the country. Some oil shows were obtained earlier this year in the Andel 2 well between the Maas and the Waal rivers in North Brabant.

N.A.M. has been carrying out an intensive wildcatting program in the Netherlands since the end of the war. Some gas production has been developed, and pipe lines are planned for its utilization.

Gas Formation Found

A gas formation has been found at a depth of about 12,500 ft. below existing oil production in Lacq field in southwestern France.

The operating company, Soc. Nationale des Petroles d'Aquitaine, said it is believed the well struck the same gas formation that was encountered last year in two tests at a depth of about 11,500 ft. Another deep well now being drilled has reached about 10,300 ft.

The Aquitaine company said the existence of a deep production in Lacq field appears very probable but it is still too early to determine its extent or to know whether it also will yield oil.

The company had a blowout in one of the two wells that were drilled last year. The gas that was tested from the deep formation had a sulfur content of 18-19 per cent. However, the well was not completed because of mechanical difficulties.

Lacq field and the old Pechelbronn area are the only oil fields of any importance in metropolitan France. Lacq was discovered in 1949 as a part of the intensive 10-year exploratory program being carried out with French Government backing at a cost of some nearly $300,000,000. The field produces around 5,800 bbl. daily from Cretaceous limestone at 2,100 to 2,400 ft.

Investigation Demanded

Reports that not all the French share of production from Iraq Petroleum Co., Ltd., is being processed in French refineries has led to demands in Paris for an investigation.

The French Economic Council, an advisory state group, has called for an investigation of French imports of crude oil. A report adopted by the council declared that the government had favored fuel imports and limited the development of catalytic cracking.

Oil officials in Paris said that the entire French share of Iraq oil is being refined by French companies and that they had no knowledge of sales at a loss of French-owned Iraq crude.

The French share in Iraq Petroleum Co., Ltd., amounts to 23.75 per cent and is held by Cie. Francaise des Petroles, partially government controlled. I.P.C.'s main source of production is from Kirkuk field, where output has been increased over the last year and a half from about 150,000 bbl. daily to nearly 500,000 bbl. daily as a result of the construction of the 30 and 32-in. Kirkuk-Banias pipe line.

THIS CRATER erupting mud and high-pressure gas was one of the two which formed in Seria field in British Borneo. All traces of a concrete plant and several small buildings formerly at this site have disappeared. (A Shell photo.)

Geysers Die Out

Full production resumed in Borneo's Seria field

HIGH-PRESSURE gas eruptions which caused two craters in Seria field in British Borneo have died out, and oil production has been resumed at the full normal rate of more than 100,000 bbl. daily.

The geysers first broke through the surface April 25. For safety reasons, five production stations were shut down, and output of the field, the largest in the Far East, was cut back to about 30,000 bbl. daily.

The operator, British Malayan Petroleum Co., Ltd. (Royal Dutch-Shell), rerouted that part of the field's pipeline system which lay in the affected area and constituted a source of potential danger. With the completion of this work, it was possible to reestablish the former production rate.

Original cause of the eruptions was a test well. This penetrated a high-pressure gas formation at about 7,000 ft. The gas entered lower pressure sands farther up the hole and from there escaped along a fault to the surface.

The craters and the eruptions of hot mud caused considerable damage. The larger of the two craters undermined a 70-ft. high plant used for the mass production of concrete, and several small nearby store buildings were pounded to pieces. The other crater collapsed a small servicing rig. As a precautionary measure, the company evacuated a housing community in the area.

Expert on the World's Geology

Walter Link has first-hand oil knowledge from Central America to the Middle East

TWENTY-EIGHT years in geological work for Standard Oil Co. (N. J.) have given Walter K. Link an easy familiarity with most of the world's actual and potential oil-producing regions.

If any one area could be called his main interest, it probably would be Latin America. And on August 1, he will return his attention to this part of the world when he takes over as exploration adviser for International Petroleum Co., Ltd., at Coral Gables, Fla.

For the last 6 years he has been chief geologist for Standard Oil Co. (N. J.), an organization whose expenditures searching for and developing oil run to roughly a million dollars a day. His travels have led him into first-hand investigations of wildcat prospects all over the world, and he can as quickly discuss the oil possibilities of Costa Rica or southern Algeria as he can the sedimentary section of Iraq.

At 50, Link retains the enthusiasm for oil-finding which characterizes the industry's top geologists. And, like most of his profession, he holds to the caution which comes out of a realization that even with the best geology the drill is still the final judge of whether oil is present.

Worked in copper mine . . . Link's field experience began during the summers while he was a student working his way through the University of Wisconsin. One vacation was spent on the end of a muck stick in a Montana copper mine, and the three others in mapping work for the Wisconsin Mineral, Land, and Road Survey.

He joined the old Standard Oil Co. of Venezuela in 1925 after graduating with a bachelor of philosophy degree and a geology major. In 1927 and 1928, he did surface mapping in the Llanos of Colombia using a mule train to carry supplies. During the seven succeeding years, he was senior geologist in field work in the Netherlands East Indies for the old Jersey affiliate, N.K.P.M.

He returned to the United States in 1935 and did surface work for Carter Oil Co. in the Arbuckle and Washita mountains in southern Oklahoma, later becoming exploration manager and chief geologist for Standard Oil Co. of Louisiana at Shreveport.

During the war years Link supervised the exploration program which the Jersey company carried out in the West Indies and Central America. In 1945, he was sent to Bogota to manage and coordinate the exploration activities of International Petroleum. Two years later he was in New York as chief geologist for the parent company.

Children in oil . . . Early last week, Link was married to the former Barbara King of La Porte, Ind. The wedding was in La Porte which is Walter's home town. He has two children by a previous marriage. One, Peter, graduated this June from the University of Wisconsin and is doing field geological work for Carter before beginning Army service next year. A daughter, Miriam Joan, is a student at the University of Wisconsin and is doing aerial photography work for Carter in Shreveport this summer.

The Link name is known in geological circles not only because of Walter but also from the work of his brother, Theodore A. Link, who for 29 years was with Imperial Oil, Ltd., and who is now a consultant in Toronto.

Albert L. Anderson, Coatesville, Pa., has been named chief of the aviation-fuels branch of the Petroleum Administration for Defense. Anderson, a special assistant to the manager of Sun Oil Co.'s refinery supply and distribution departments, succeeds **Donald P. Heath,** who has returned to Socony-Vacuum Oil Co. research and development laboratories in Paulsboro, N. J. **Harvey N. Frost,** Beaumont, Tex., has been named chief of the petroleum-products-supply branch of PAD, succeeding **James E. Lee,** who has returned to Gulf Oil Corp.

David M. Grubbs, formerly vice president in charge of land and exploration for Drilling & Exploration Co., Inc., has opened an office as a consulting geologist in Houston.

Walter M. W. Splawn, 70, has retired effective June 30, after 19 years as a commissioner for the Interstate Commerce Commission. He served on the Texas Railroad Commission before going to Washington.

Noboru Kawakami has joined the geological staff of British-American Oil Producing Co. in Regina, Sask. He formerly was with **J. R. Fanshawe,** Billings, Mont.

Donald M. Davis has been named manager of the geological and exploration department of Pure Oil Co., succeeding **Lynn K. Lee,** who will retire June 30. A veteran of 26 years with the company, Davis has been in the Chicago office the past 18 months.

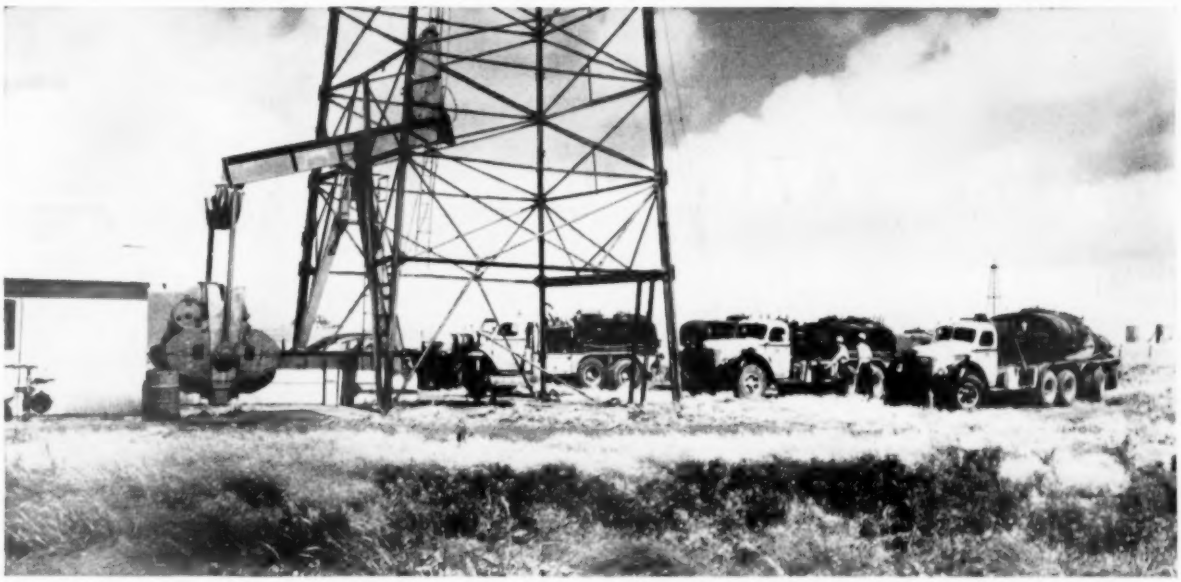
Wayne L. McCann has resigned as district engineer for Stanolind Oil & Gas Co. in Shreveport to open an office there July 1 as a consultant in petroleum engineering and geology. He has been associated with Stanolind since 1942 in various engineering positions in Kansas, Oklahoma, and Louisiana.

G. O. Mickelson, consulting geologist, has moved from Sterling, Colo., to Denver.

C. A. Chipman, Bolivar, N. Y., oil producer, has been elected president of the Pennsylvania Grade Crude Oil Association. He succeeds **C. E. Streeter,** Bradford, Pa., producer. **A. C. Simmons,** Bradford producer, was elected vice president succeeding Chipman. All other officers were reelected. New members of the board of directors named at a recent meeting in Pittsburgh are **W. H. Beim,** W. H. Barber Co., Chicago, and **M. H. Hindman,** Penn-

PRODUCTION INCREASED FROM 60 TO 450 BOPD WITH XM ACID

DOWELL XM Acid treatment boosted production after ordinary acid failed to improve flow



This new oil well had been completed in a dolomitic limestone formation. Ordinary acid had failed to improve production from this and neighboring wells. A trace of emulsion and incomplete return of the spent acid suggested that effective permeability had been reduced by swollen silicates plugging the pore spaces.

The operator decided to employ a Dowell treatment using XM Acid to control silicate swelling and increase production. As a result, production went from 60 to 450 BOPD and the XM Acid treatment resulted in a quick kick-off and clean-up for the operator.

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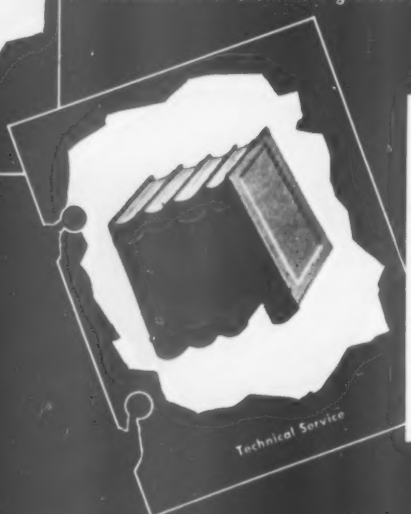
Gelling Agents



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In Canada: North American Cyanamid Limited, Toronto and Montreal

sylvania Refining Co., Butler, Pa. **E. C. Breene,** Oil City, Pa., first president of association, was named an honorary director for life.

Thomas B. Burns, geologist for Lion Oil Co., has been transferred from Wichita to Denver.

Arthur H. Petsch, Ohio Oil Co., has been elected president of the Panhandle Geological Society of Amarillo, Tex. Other officers are: **Paul H. Horn,** Sun Oil Co., vice president; **W. D. Blackmon,** Gulf Oil Corp., secretary; and **W. H. Fitzgerald,** Continental Oil Co., treasurer.

Maxel Powell has resigned, effective July 1, as an engineer for the Texas Railroad Commission to join Joe Ballanfonte, Austin, Tex., consultant.

James B. Randel, Jr., natural-gas regulatory engineer in the gas-certificate division of the Federal Power Commission, has resigned, effective July 1, to join Public Service Gas & Electric Co. in Newark, N. J. He is a petroleum-engineering graduate of the University of Oklahoma.

Jerry Doroshenko has resigned as assistant district geologist for Amerada Petroleum Corp. in Williston, N. D., to join the Billings Geological Service.

A. STAMBAUGH

A. A. Stambaugh, chairman of the board of Standard Oil Co. (Ohio), Cleveland, has been elected a vice president in charge of the general management division of the American Management Association. New directors include **H. N. Mallon,** president, Dresser Industries, Inc., Dallas, and **A. L. Nickerson,** vice president in charge of foreign operations, Socony-Vacuum Oil Co., Inc., New York.

J. B. Steele will retire July 1 as vice president of Kewanee Oil Co., Tulsa. He will continue, however, as a director of the company.

Wilbur H. Knight has been elected president of the Mississippi Geological Society. Other officers are: **A. E. Blanton,** Sun Oil Co., vice president; **Luther C. Powell,** The California Co., treasurer; and **Ben W. Ploch,** Skelly Oil Co., secretary.

German Scientists Visit Oil Capital

Two German scientists discuss secondary-recovery operations with Keller Henderson (center), chief field engineer for Dowell Incorporated, in Tulsa. At left is Dr. Walter L. M. Tunn, research laboratory of Gewerkschaft Elwerath, Hannover, Germany, and at right, is Dr. Wolf von Englehardt, research-laboratory chief of Gewerkschaft Elwerath. The pair is on a 6-week tour of the United States. Their Tulsa itinerary included visits to the Tulsa research laboratories of Carter Oil Co., Stanolind Oil & Gas Co., Dowell Incorporated, and Earlougher Engineering Co. They also planned to visit laboratories of Schlumberger Well Surveying Corp., Gulf Oil Corp., and Humble Oil & Refining Co., as well as Penn State College and the universities of Illinois and Chicago.

R. M. Miller, division superintendent for Ohio Oil Co. in Bakersfield, Calif., since 1944, has been appointed assistant manager of the Los Angeles production division. **W. T. Kennedy,** formerly assistant division superintendent of the Los Angeles division, has been named to succeed Miller. Both men will continue to be located in Bakersfield.

Fred Wilcox, engineer in the evaluation section of the production division of Deep Rock Oil Corp., Tulsa, has been transferred to the eastern Kansas district in Garnett. **H. E. Cobb, Jr.,** has returned to the company following service in the U. S. Navy in the Korean area and has been named an intermediate engineer in the production division's evaluation section.

George B. Holden has been named head of the new research-statistical division of the Louisiana Conservation Department. Holden formerly was assistant chief engineer in the department and later a consultant.

Robert H. Meyer has been named head of the new research and development section of Sinclair Pipe Line Co.'s general engineering department in Independence, Kans. In his new post, Meyer will coordinate research problems with Sinclair Research Laboratories, Inc., Harvey, Ill., and will handle specialized development for the company's pipe lines. He has been pipeline representative at the research laboratories at Harvey since last year.

John E. Rouse, vice president in charge of operations and a member of the board of directors of Stanolind Oil & Gas Co., has retired after 40 years with various oil companies. He has been a Tulsa resident since 1945, when he became the first manager of Stanolind's manufacturing department. He has been vice president since 1948.

Gerald M. Johnson has been elected vice president and a director of Sinclair Pipe Line Co. in Independence, Kans. He has been superintendent of the Texas division of the company at Fort Worth since it was organized in 1951. He has been in the pipe-line business since 1920 when he joined the old Prairie Pipe Line Co. as a draftsman.

H. E. Cotton, general superintendent of the Casper, Wyo., refinery of Standard Oil Co. (Ind.), has been named to succeed **Dr. G. F. Ordeman** as manager of the Wood River, Ill., refinery.

PERSONALS

Dr. Ordeman will retire August 1 after nearly 34 years' service with the company. **L. H. Butterworth,** manager of the operations and cost-control division of the manufacturing department in the firm's Chicago general office, will be advanced to general superintendent in Casper. **F. C. Smith,** superintendent of the operations and cost-control division, will be promoted to manager.

Silas C. (Buzz) Brown has resigned as district geologist for General Petroleum Corp. in the Four Corners area to become an independent consulting geologist. He will continue to make his home in Durango, Colo. He was in Colombia, South America, for Socony - Vacuum Oil Corp. from 1940 to 1942 and later worked for the U. S. Geological Survey. He joined General Petroleum in 1948.

Alvin P. Loskamp, who has been engaged in geological consulting in the Midland, Tex., area since 1950, has become associated with **E. B. Noble,** Los Angeles petroleum consultant.

Rex Harvill has been appointed senior engineer and utilities foreman at the plant of Texas City Refinery, Inc. He has been with the company since January 1951, serving in the engineering department.

Louis F. Graham, junior engineer for Transcontinental Gas Pipe Line Corp., has been transferred from Laurel, Miss., to Billingsley, Ala.

Alec Crowell, oil and gas consultant, has moved from New Orleans to manage Williston basin properties for a group of independent operators and individuals. His temporary headquarters are in Glendive, Mont.

R. M. Darling, who has been with Stanolind Oil & Gas Co. since 1941, has been appointed division engineer in Houston. Other changes involving engineering personnel in the Texas-Louisiana Gulf Coast division include: **F. L. Nelson,** district engineer in the Lake Charles, La., area, named assistant division engineer; **G. M. Johnston,** formerly district engineer in Houston, named staff petroleum engineer; and **Richard L. Evans,** senior petroleum engineer in Houston, appointed district engineer in Lake Charles, La.

Joe E. Stewart, production engineer for Ohio Oil Co., has been transferred from Gross Creek, Wyo., to Casper.

Loren C. Skinner has been named chief engineer of Grace Chemical Co.'s nitrogen plant, which is now under construction near Memphis.

Helmut Klaus, Klaus Exploration Co., has been elected president of the Lubbock, Tex., Geological Society. Other new officers are **Dr. W. C. Hayes, Jr.,** consultant for Cecil M. Hawk & Associates, vice president; and **Jack M. Reed,** Stanolind Oil & Gas Co., secretary-treasurer.

W. C. Dinger has joined **R. W. Simpson, Jr.,** and **Russell S. Tarr** as production superintendent. Dinger, a University of Oklahoma graduate, formerly was assistant drilling superintendent for Mountain States Fuel Co. in Rock Springs, Wyo.

S. Moro has been named plant engineer of the new Shell Oil Co. chemical plant at Montreal, Que., stepping up from his assignment as assistant project engineer.

Harry W. Abruns, General American Oil Co., and **Clare V. Goodwin,** Blair Holdings Corp., have been elected new directors of Westates Petroleum Co.

Perry Gill, North and West Texas district production superintendent for Sunray Oil Corp. in Midland, has been named purchasing agent in Tulsa. He joined Sunray in 1946 as a district engineer for North and West Texas and was named superintendent of producing operations in that area in 1948.

Charles T. Whitney, formerly manager of Coastal Drilling Co. in California, has been promoted to vice president in charge of operations.

George F. Eustis, Esso Standard Oil Co.'s Bayway mechanical superintendent, will leave late this summer on a 2-year rotational assignment as manager of the Campagna refinery in Argentina.

H. L. Phillips has been elected chairman of the board of Sinclair Oil & Gas Co. and **H. B. Smith** has been elected president and chief executive officer. The executive offices of Sinclair, which is the producing subsidiary of Sinclair Oil Corp., will be maintained in Tulsa under the direction of Smith and **J. W. Jordan,** executive vice president. Smith, who succeeds Phillips as president, joined Sinclair Oil & Gas in the land department in 1919 and has devoted his entire career to exploration and production. Jordan entered the oil business as an employe of Sinclair Cudahy Pipe Line Co. in 1916 and transferred to the producing company in 1919. Phillips has been president of the producing company since 1930. He joined Sinclair Oil & Refining in its legal department in 1916 and in 1922 became president of Sinclair Crude Oil Purchasing Co.

DEATHS

R. Gorman Phelps, Sr., 61, who had been chief of the petroleum division for the East Coast of the Office of Price Stabilization, died June 17 in Yonkers, N. Y. He also served as division manager in Boston and New York for Colonial Beacon Oil Co., president of Sylvestre Oil Co. in New York, vice president of Meenan Oil Co. and during World War II was chief of the chemical and drug division of the OPS.

Maurice T. Grubb, 52, Houston independent operator, died in New York June 18. He was a partner in the firm of Grubb & Hawkins, which has extensive holdings in Texas and Louisiana. He moved to Houston in 1932 as an independent and formed a partnership with H. L. Hawkins, New Orleans operator, about 10 years ago. He also had holdings in Sheridan field, Texas, and 50 per cent interest in Gilger Drilling Co.

L. P. Pattin, 71, retired oil contractor, died recently in Independence, Kans.

Samuel W. Everett, 66, Scarsdale, N. Y., retired executive of Sinclair Refining Co., died June 15 in Bronxville.

Charles R. Shepherd, 60, district production department foreman for Sunray Oil Corp. in Perry, Okla., died in Oklahoma City June 20. He had been with Sunray since 1926.

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PREIGNITION—Does It Provide Roadblock To Greater Efficiency in Fuel Utilization?

"Preignition is at present factor threatening to limit compression ratios"

by J. R. Sabina,* J. J. Mikita,* and M. H. Campbell*

THE chemical phenomenon of knock assumes great importance because it limits the compression ratio of engines and thus restricts the efficiency with which the chemical energy of fuel can be converted into work.

The average compression ratio of American passenger cars increased from 4.8:1 in 1930 to 7.5:1 in 1953. This change alone is sufficient to cause approximately a 15 per cent increase in the fuel-utilization efficiency of engines.

It now appears that the continuing drive for more efficient utilization of gasoline has brought to the forefront another combustion problem, viz., preignition. It was during World War I that preignition was recognized as an abnormal combustion phenomenon quite different from knock, but until recently it was critical only in high-output aircraft engines. Now, however, preignition occurs extensively in high-compression-ratio automobile engines, and is at present the factor threatening to limit compression ratios. It is reported that many "knock" complaints in recent-model engines are actually the result of preignition. This means that the preignition resistance of fuels is assuming greater importance, and that this fuel-combustion performance factor should be taken into consideration by refiners and engine manufacturers.

It should be emphasized that the current knowledge of preignition is about the same as was knowledge of knock in the late '20s. If further substantial progress in the utilization of fuels is to be made, the concerted effort of both the refiners and engine manufacturers is required on the preignition problem just as it was on the knock problem. Particularly needed at this time are satisfactory test methods or tools with which to overcome the problem.

Definitions . . . The various types of combustion phenomena can be divided into five categories as follows:

1. Normal combustion, as illustrated in Fig. 1, occurs when the fuel-air mixture is ignited by the spark and the flame progresses across the combustion chamber at a normal velocity through the engine charge, consuming the last part of the charge to burn, or the "end gas," without any sudden change in the rate of energy release.

2. Knock differs from normal combustion in only one important respect. The flame, initiated in the normal manner by the spark, advances at a normal rate through the charge. However, the last portion of the charge does not burn normally but, rather, reacts violently, releasing its energy almost instantaneously. This sudden release of energy sets up a shock wave which travels back and forth across the combustion chamber. The high-frequency wave sets some part of the engine structure in vibration, resulting in the noise called knock. The quantity of charge which undergoes this rapid release determines the intensity of the knocking sound.

3. Preignition takes place when some portion of the charge is ignited by a hot surface and a normal flame is started before the spark. Consequently,

*Authors are associated with E. I. du Pont de Nemours & Co., Wilmington, Del. Portion of paper presented at A.P.I. midyear meeting, N. Y., May 14, 1953.

Why Preignition Is Important . . .

"WE never seem to get rid of any problems, we just keep adding new ones." This plaintive but timely remark was made recently by a refiner emerging from a technical session on preignition, at the A.P.I. midyear meeting in New York.

While preignition of fuel-air mixtures in engines has long plagued the aviation industry, it now appears to have moved in on the automotive industry, and may well become a governing factor in judging the future quality of motor fuels. For the past two decades, the octane number of motor fuel has represented the resistance of gasoline to **self-ignite** under high pressure and temperature occurring in combustion chambers of automotive engines. The upward trend in octane numbers and engine compression ratios has resulted in more power from each gallon of gasoline.

At the present level to which compression ratios have risen, it appears that "knock," previously caused by **self-ignition** of the fuel-air mixture, is in many cases also a result of **preignition** of the fuel. Engine deposits are the culprits. Due in part to the catalyst action of certain metallic salts present in such deposits, the carbon component continues to burn or "glow" after each power cycle. This causes the fuel-air mixture for the following cycle to begin to burn before the spark. The result is loss of power and in some cases, knocking.

What does this preignition problem involve? It means that automotive engineers must attempt to design engines which will suppress preignition. It also means that refiners must now look at octane from a new angle. The old problem of making fuels less susceptible to self-ignition or knock as it was commonly known, still remain. Superimposed is the new requirement for (1) reducing combustion-chamber deposits, (2) reducing the tendency of such deposits to glow and preignite the fuel, and (3) tailoring gasoline from blends of hydrocarbons which show higher resistance to preignition.

As deposits accumulate in their combustion chambers, some of the high-compression automotive engines introduced this year show a tendency to preignition. One car in particular is understood to be definitely so limited, showing octane requirement increases due to build-up engine deposits during the first 10,000 miles, which raise its requirement in some cases to over 100 octane.

While little is known of the fundamentals of this phenomenon at present, some action is being taken to combat it. Characteristically, this action comes from the oil industry and from those companies serving it. Shell has taken one step, with the T.C.P. additive which reduces engine deposits. Another promising additive may be an unrevealed compound termed "Z," which according to laboratory tests conducted by du Pont, appears to be outstandingly effective in suppressing deposit glow.

Although the problem is first being attacked from the deposit standpoint, it may in the future require some revisions in processing of motor fuel by the refiner. Preliminary studies indicate that certain hydrocarbons show superior preignition resistance. These components are not necessarily the same which give highest octane performance, based on high resistance to self-ignition.

The preignition problem warrants the attention which it is now receiving from the oil industry. Reprinted here and in the issue of July 6 are portions of two technical papers recently presented on the subject, plus portions of two prepared discussions which followed them.

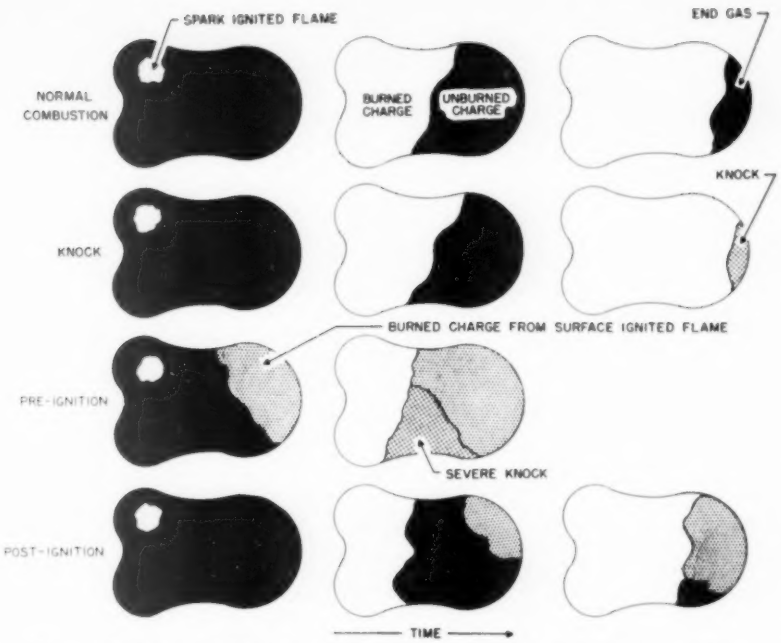

Fig. 1—Schematic diagrams of four types of combustion encountered in engines.

with preignition, two or more separate flames may advance through the combustible charge—one or more from the preignition, and another from the spark, as shown in Fig. 1.

Preignition manifests itself in several ways; three of the most important are:

a. Wild ping: This is the occurrence of very erratic, sharp, loud cracks. The phenomenon, which may be accompanied by knock, often takes place at low speeds, generally in but one or two cylinders, and at either part throttle or full load.

b. Thudding: This is a low-frequency vibration of the engine structure caused by extremely early ignition of the charge. The resulting sound might be compared to that occurring with loose main bearings.

c. Run-on or after-running: This is continued operation after the ignition is turned off, when the engine is idling or when it is operating on the road under load.

The multiple burning which occurs with preignition causes earlier completion of combustion and a rate of pressure rise much higher than normal. The result is often "thudding" or "wild pinging." Whether wild pinging or thudding occurs is determined by the ability of the "end gas" to withstand the very high pressures and temperatures without detonation before the flames consume the charge. A wild ping is heard if the end gas knocks. It should be emphasized that, although a wild ping is an isolated severe knock, the cause of this event is a preignition of the charge. Thus, preignition sometimes causes knock by advancing the ignition, and might be compared to advancing the spark.

4. Postignition is the same as preignition, except that the second flame is initiated after the primary flame has been ignited by the spark (Fig. 1). Because lower peak pressures and temperatures are reached than with preignition, thudding and wild pinging are less severe, and frequently the only manifestation of postignition is after-running.

5. Autoignition is a frequently used term which includes any self-ignition of the charge independent of the spark or a hot surface. By this definition, the term autoignition includes knock, but excludes preignition, postignition, and normal spark-initiated combustion.

Judging from their physical nature, preignition and knock are distinctly different combustion phenomena, and are usually so considered. From a fundamental standpoint, however, the preignition reactions which start a normally burning flame front on a hot surface may be related to the violent knocking reaction of the end gas. It is known that in each instance high-temperature hydrocarbon-oxidation reactions are involved. It is probable that in preignition these reactions lead only to the initiation of a flame simply because they are highly localized around a hot surface.

With knock, on the other hand, all of the unburned charge is sensitized and a much larger portion of the mixture is involved in the explosive reaction, enough to create shock waves and cause the knocking sound. Considerably more detailed chemical investigations of the preignition phenomenon are neces-

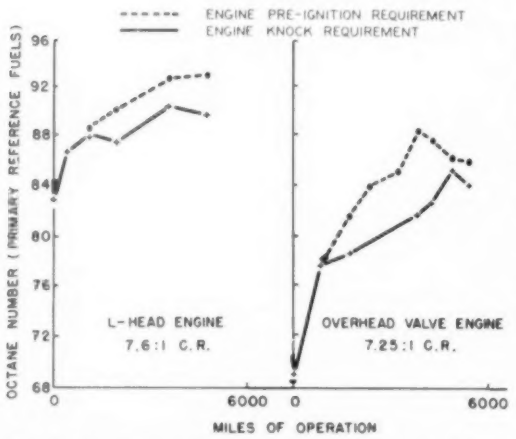

Fig. 2—Preignition and knock requirements of an L-head engine and an overhead-valve engine operated under heavy traffic conditions in road tests.

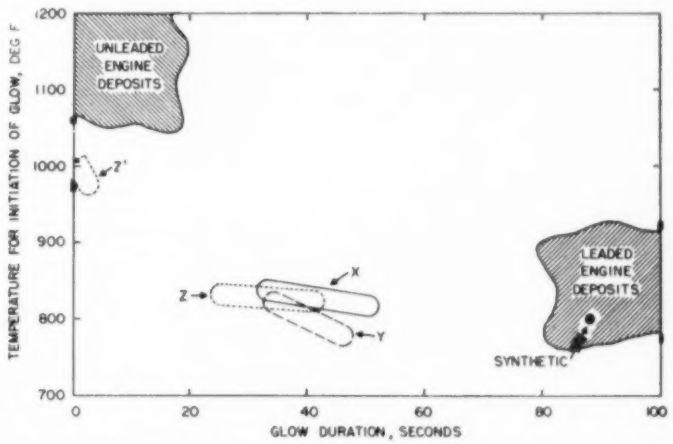

Fig. 3—Effect of additives on the glow characteristics of synthetic engine deposits.

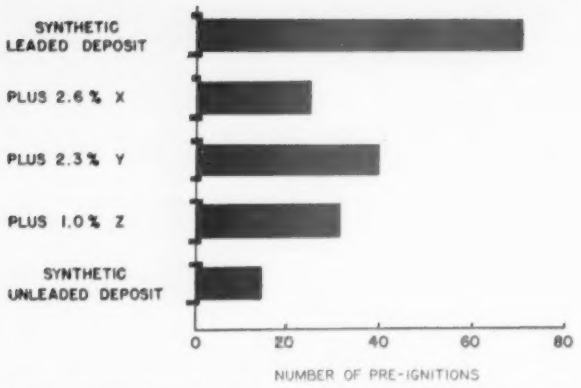

Fig. 4—Suppression of preignition by modification of synthetic deposits: Tests conducted with the aspirated deposit preignition test using benzene as the fuel.

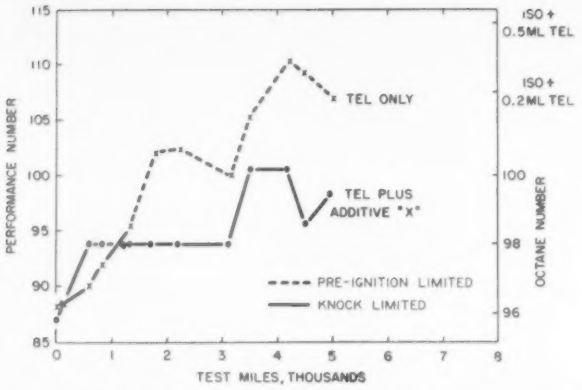

Fig. 5—Effect of fuel additive "X" on preignition requirements of cars equipped with 9:1 compression-ratio engines operated under low-duty traffic conditions: gasoline was leaded 3 ml. per gallon, and oil was MIL-O-2104 grade.

sary before differences in the exact mechanisms of preignition and knock become clear.

Magnitude of the problem . . . In low-duty city driving the preignition requirements of many cars are higher than the knock requirements. Typical data illustrating this fact are given in Fig. 2 for an L-head engine and an overhead-valve engine. These results were obtained with test cars operated in convoy by laboratory personnel over a prescribed course in a high-traffic-density metropolitan area, using leaded gasoline and a heavy-duty type of oil containing both a detergent and an antioxidant. The preignition manifested itself chiefly in the form of wild pings.

As indicated in Fig. 2, the preignition requirement of the cars was two to four units higher than the knock requirement. Thus the engines were truly preignition-limited, not knock-limited. These data may represent a conservative estimate of the magnitude of the preignition problem, inasmuch as primary reference fuel blends of n-heptane and isooctane were used to measure the requirements during acceleration on a level road. If temperature-sensitive rating fuels had been employed, or if the ratings had been made under hill-climbing conditions, the preignition requirements might have been even higher.

Inasmuch as critical preignition does not take place until after engines have been operated for some time, it is apparent that combustion-chamber deposits must be largely responsible. Detailed investigations in the authors' laboratories and by others have demonstrated that very hot or glowing combustion-chamber deposits ignite a portion of the compressed gasoline-air mixture. In addition, however, it also is known that fuels themselves differ in their preignition resistance. Thus there are two basic factors involved in the phenomena of preignition and postignition in automotive engines:

1. The tendencies of combustion-chamber deposits to glow or cause surface ignition.

2. The ability of the fuels themselves to withstand ignition by hot surfaces.

These two key phenomena have been the subject of a rather extensive research program, and some of the results of this investigation are presented in the remaining sections of this paper.

Role of combustion-chamber deposits in preignition . . . Ordinarily there is no preignition without combustion-chamber deposits; but, with deposits, preignition manifests itself and influences the fuel requirements of cars. This is in contrast with the knock problem in which deposits aggravate knocking but are not essential for its occurrence.

Many workers have shown that, in order to cause preignition, surfaces must be at very high temperatures, at least 1,600° to 1,900° F. In confirmation of this fact, Withrow and Bowditch of General Motors have obtained photographs of engine combustion showing that the combustion-chamber deposits which cause preignition are those hot enough to glow. Glowing deposit particles exert this harm either when attached to the combustion-chamber wall or while they are floating about as flaked particles in the working fluid for one or more cycles before they are blown out past the exhaust valve.

Because glow must be present to cause preignition, combustion-chamber deposits which are curled away from the walls and which can break off easily are more harmful than those which are tightly adherent. Such deposits are formed most readily under mild-duty operating conditions such as exist in city driving.

In order for combustion-chamber deposits to glow, they must contain combustibles in the form of the carbonaceous residues arising from the decom-

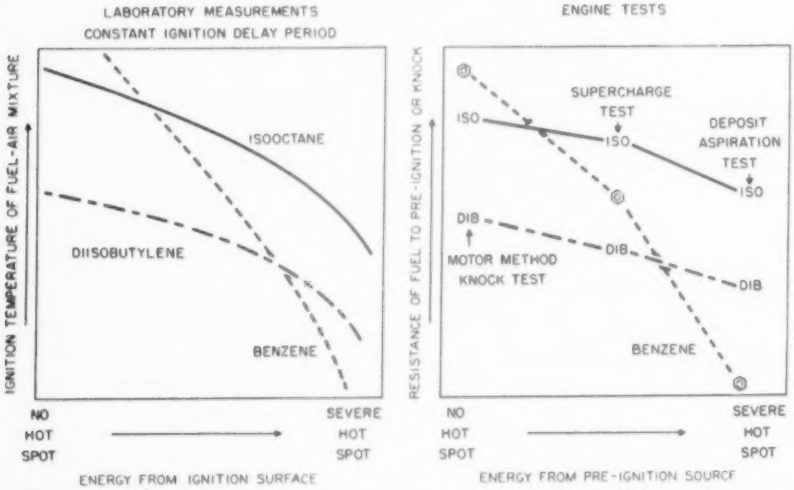

Fig. 6—Severity of preignition source may be one of the most important factors in the preignition problem.

position of lubricating oil and gasoline within the combustion chamber. A second type of deposit constituent which plays an important role in the tendency for deposits to glow is a catalyst for the oxidation of carbon, a material which lowers the temperature at which glow will start and increases the intensity and duration of the reaction.

The most important catalyst found in engine deposits are metal salts of various kinds, particularly lead salts. This accounts for the observation that leaded gasolines frequently form deposits which cause more preignition than do deposits from unleaded gasolines.

Test methods . . . Test procedures to evaluate the preignition harm of combustion-chamber deposits are almost nonexistent, chiefly because in the past interest was centered on the preignition performance of the fuels themselves. The variety of engine tests employed in this investigation fall into two main categories:

1. Tests in which combustion-chamber deposits are accumulated in the laboratory or on the road under reproducible mild-duty operating conditions, with periodic wide-open throttle accelerations to measure the quality of the fuel required to avoid wild pings or other noises associated with preignition: Various reference-fuel systems have been used, and on occasion supplementary instrumentation has been employed to assist in differentiating between preignition and knock.

2. Tests which measure the effects on preignition of small particles of engine deposits aspirated into the cylinder of an engine operating on a fuel of suitable sensitivity: Preignition is detected and counted by special instrumentation.

Additives to reduce deposit glow . . . Substitution of a wide variety of metal oxides and salts for one-quarter of the lead salts present in the synthetic deposit was found to have widely different beneficial and harmful effects. The effectiveness of three additives, designated "X," "Y," and "Z," is illustrated in Fig. 3. It will be noted that the principal benefit of these additives was in reducing glow duration; increases in the temperature for the initiation of flow were usually negligible. However, one special form of "Z," designated Z in Fig. 3, was outstandingly effective —decreasing glow duration to almost zero time, and increasing the flow initiation temperature appreciably.

Confirmation of the significance of these observations was obtained by making additional synthetic "leaded deposits" containing small quantities of additives "X," "Y," and "Z," and evaluating them in the aspirated deposit preignition test. The results illustrated in Fig. 4 showed that the presence of less than 3 per cent of each of these additives caused a substantial reduction in preignition harm. Slightly larger quantities practically nullified the catalytic effects of the lead salts, reducing the deposit preignition tendency to that of the synthetic unleaded deposit which contained no metal salts.

"Preignition takes place when some portion of the charge is ignited by a hot surface and a normal flame is started before the spark."

Additives "X" and "Z" were evaluated in high-compression-ratio engine-deposit accumulation tests both on the road and in the laboratory. One material was consistently effective in reducing deposit preignition, and the other was useless because of characteristics other than its effect on glow.

The road tests were conducted under very mild driving conditions along a prescribed course through the downtown streets of a large city. A group of four cars which had 9:1-compression-ratio eight-cylinder engines was used, and every necessary precaution was taken to have the test drivers operate the cars in a reproducible manner. The fuel used was a 50-50 mixture of catalytic cracked and straightrun components leaded 3.0 ml. per gallon, and the oil was of MIL-O-2104 grade. In each of two separate tests two of the cars were operated on the leaded fuel, and the other two were operated on the leaded fuel to which had been added additive "X" or "Z."

A significant reduction in preignition was obtained with additive "X," as shown in Fig. 5. The data illustrated are the averages obtained with two cars operated on each fuel. Without the experimental additive, preignition manifested itself at 1,200 miles, and continued throughout the test each time the cars were accelerated at wide-open throttle for a requirement determination.

The addition of additive "X" to the leaded gasoline had two significant benefits:

1. The engine-fuel quality requirements were reduced about 8 performance numbers, or about 2 octane numbers.

2. Preignition was eliminated as a limiting requirement of the engines.

Additive "Z," when evaluated in a similar test, was found to have no beneficial effect. This observation that "X" is effective in suppressing preignition, whereas "Z" is not, has been confirmed in high-compression-ratio multicylinder-engine tests conducted in the laboratory.

Two general observations may be made with regard to the foregoing information:

1. Simple laboratory deposit glow tests do not necessarily predict the preignition-inducing characteristics of deposits in engines.

2. It is possible to reduce or eliminate the preignition tendencies of deposits by means of additives in the fuel, as indicated by road tests.

The preignition resistance of fuels . . . The second principal factor in the preignition problem is the behavior of fuels. The literature on the preignition resistance of fuels deals largely with performance in aircraft engines operated under conditions much more severe than those encountered in passenger-car engines. Nevertheless, the information, especially that developed by the National Advisory Committee for Aeronautics during the early years of World War II, has been helpful in studying the preignition problem in passenger-car engines.

Engine studies of fuel preignition . . . Various types of hydrocarbons have been evaluated, by both the deposit aspiration and supercharge preignition tests, to gain some insight into the effect of fuel structure on performance.

1 Isooctane is best; the branched olefin (diisobutylene) is rather good; but the simplest aromatic (benzene) is very poor.

2. Individual aromatics differ widely in preignition resistance—xylenes and toluene being good, and cumene being very bad.

Similar data obtained with these same hydrocarbons by the supercharge preignition test show rather different results. In this test:

1. Diisobutylene, the poorest fuel, is quite inferior to benzene, which is almost as good as isooctane.

2. Mixed xylenes and toluenes are substantially superior to isooctane, which usually is regarded as being a very preignition-resistant fuel.

It is apparent that test conditions have a great effect on the preignition ratings of fuels. Differences in preignition evaluation techniques can reverse the relative order of merit of some fuels drastically, as is illustrated by the following summary of results:

	Type of preignition test	
Hydrocarbon—	Deposit aspiration	Supercharge
Isooctane	Good	Good
Diisobutylene	Fair	Very poor
Benzene	Very poor	Fair

In order to determine which of the two laboratory test procedures rated the fuels more realistically, these same three hydrocarbons were evaluated in road tests. The most consistent data were obtained with a car equipped with a 10:1 compression-ratio V-8 engine in which reproducible combustion-chamber deposits were created by periods of idling on leaded gasoline. The measurement of fuel-preignition resistance was the maximum throttle opening with which the car could be accelerated to 60 m.p.h. with no more than trace preignition. The data obtained added to th confusion because in this test isooctane and diisobutylene rated the same, although benzene was appreciably inferior.

From these three conflicting sets of preignition ratings on the same hydrocarbons, it is apparent that an empirical approach to the problem of evaluating fuel quality must be supplemented by a study of the fundamental factors involved. Such an investigation was initiated in the laboratory to determine the resistance of fuels to ignition by hot surfaces.

Laboratory studies of fuel preignition . . . Lack of agreement on spontaneous ignition temperatures in the literature is so marked that only the most general correlations with fuel structure have been possible. The reason for this is that the measurements were usually made under but one particular condition and, therefore, only a narrow picture of the over-all performance characteristics was obtainable.

An analysis of the problem of preignition in engines indicated that the fundamental, interdependent physical factors involved are:

1. The extent to which the igniting surface is hotter than the surrounding fuel-air mixture: This is a measure of the rate of local energy transfer from the igniting surface to the charge.

2. The temperature of the fuel-air mixture: This is important because it governs the extent to which precombustion reactions take place; such reactions are known to increase the ignitibility of fuels by hot surfaces.

3. The time the hot fuel-air mixture is exposed to the still hotter igniter: This is of obvious importance; longer periods of fuel sensitization permit ignition by lower temperature "hot spots."

To obtain the basic information needed, a suitable laboratory apparatus was devised to measure the time required for ignition of fuel-air mixtures maintained at various temperatures with the ignition source heated electrically to various extents. In addition to providing valuable information for a chemical attack on the preignition problem, data obtained in this manner have been valuable in helping to clarify why the relative preignition ratings of fuels change drastically from engine test to engine test.

"It is apparent that an empirical approach to the problem of evaluating fuel quality must be supplemented by a study of the fundamental factors involved."

Isooctane, diisobutylene, and benzene have been investigated extensively in the laboratory apparatus. Typical data obtained at a constant very short ignition-delay period are presented in the left half of Fig. 6. These data indicate the effect of thermal energy from the igniter on the ignition temperatures of these three hydrocarbons. The severity of the ignition source employed varied from no hot spot at all, corresponding to conditions in engine-knock tests, to a severe hot spot, corresponding to engine tests in which the preignition source is at a very high temperature. These measurements indicate that the rate of energy flow from the ignition surface is a controlling factor which determines the relative order of merit of fuels. Thus, with a very short igniter, isooctane is best, dissiobutylene is intermediate, and benzene is poorest. Diisobutylene is worst and isooctane is best with an ignition surface of intermediate severity, and a third order of rating exists with no hot spot at all.

Some confirmation that the severity of the preignition source may be one of the most important variables in determining the relative order of merit of fuels in engine tests is furnished by the data plotted in the right half of Fig. 6. These engine test data show the resistance of these fuels to preignition or knock at three levels of severity of preignition source:

1. Very hot, known to exist in the deposit aspiration preignition test in which glowing particles cause the preignition.

"Whoa!"

2. Moderate, known to be the case in the supercharge preignition test in which the igniting surface is a spark plug.

3. No hot spot at all, as in the A.S.T.M. Motor Knock Test Method.

The qualitative similarity to the relative fuel ratings obtained in the laboratory apparatus and in engines is striking. With each type of data, variations in igniter severity have the same effect of altering the merit order of the three fuels tested. The practical implication of these findings is that at least two levels of hot-spot severity will be required to define the preignition performance of fuels in engine tests.

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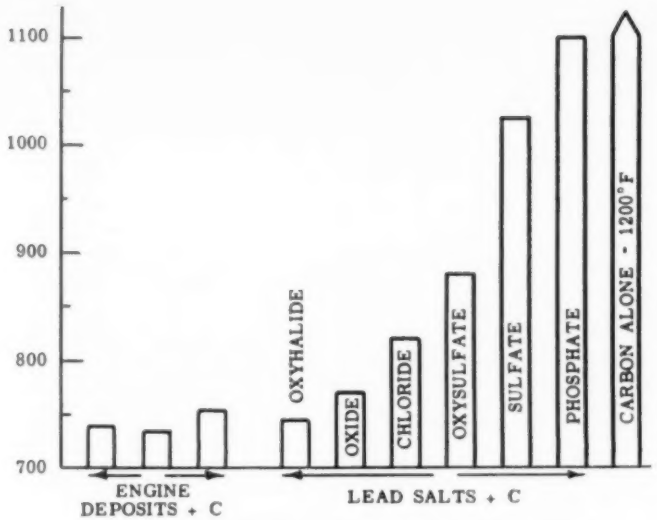


Fig. 1—Temperature for 10-second ignition-delay time.

CONFIRMATION OF TESTS

Oil Industry Finds Fuel Additives Can Help in Controlling Preignition

by R. J. Greenshields*

THE authors, Sabina, Mikita, and Campbell, are to be complimented on a very well conducted research program on preignition. Our laboratories have also been studying preignition for a number of years in aircraft and automotive engines and, like the authors, have found it a very difficult and elusive phenomenon of combustion to study. The purpose of discussing the paper is, in general, to confirm du Pont's findings with similar data obtained on different equipment and by different test procedures and possibly add more information on this important subject.

During the early part of World War II, we studied the preignition resistance of various aviation fuel components in several engines.

In our study of ignition from deposits we approached it in a slightly different manner, but arrived at the same conclusions. In some bench test work a steel block containing a number of wells was heated to a given temperature and lead salts and carbon mixtures introduced into the wells. The time required for the ignition of the carbon was measured. In this manner the ignition delay over a wide temperature range was established. Some of the results are shown in Fig. 1. With a 10-second delay time it can be seen that engine deposits ignite at a tem-

*Shell Oil Co.

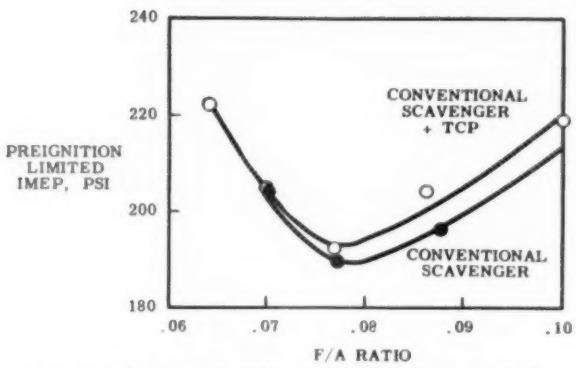


Fig. 2—Knock-free preignition ratings, modified F-4 engine.

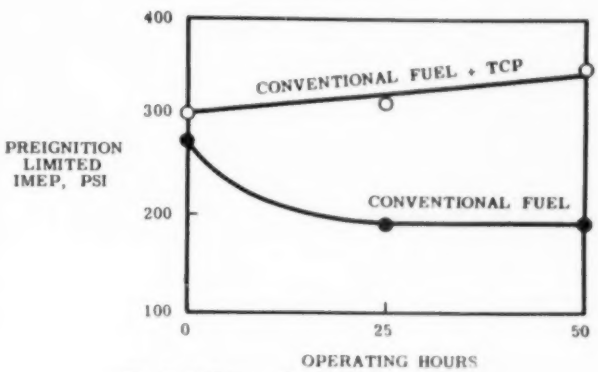


Fig. 3—Influence of deposits on preignition.

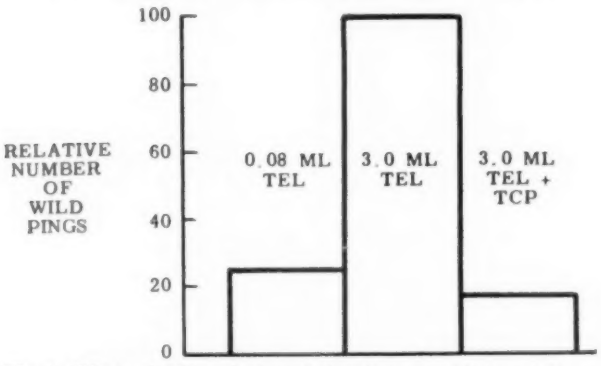


Fig. 4—Effects of TEL and tricresyl phosphate on wild ping, single-cylinder cyclic test.

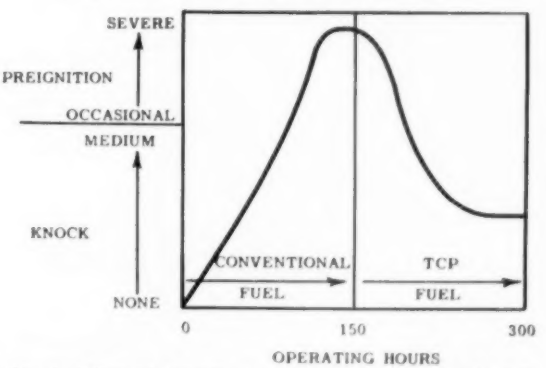


Fig. 5—Effect of deposits on knock and preignition in full-scale automotive engines.

perature of about 750° F. Synthetic mixtures of deposits of lead salts and carbon varied from 750° to about 1,000°. The engine deposits have ignition delay characteristics similar to those of lead oxyhalide and lead oxide. We have reported studies of combustion-chamber deposits in two S.A.E. papers, "Aviation Spark - Plug Fouling—Its Cause and Control," January 1952, and Spark-Plug-Fouling Studies," March 1952. There is considerable difference in the composition of the deposits in various locations in the combustion chamber depending upon the temperature. We have found that the activity of these various deposits from the standpoint of ignition delay corresponds very closely to synthetic mixtures prepared in the laboratory. It will be noted in Fig. 1 that the lead phosphate and carbon gave an ignition delay nearly equal to that of pure carbon.

As indicated in the two previously mentioned papers, we have been doing considerable work on spark-plug fouling and combustion-chamber deposits. This led to the use of tricresyl phosphate as a supplementary scavenger to prevent spark plug fouling. At the same time we were investigating the effect of tricresyl phosphate on preignition in aircraft and automotive engines. We confirm the work done by du Pont, General Motors Research, and others that certain fuel additives can help control preignition where deposits are the source of ignition.

An instantaneous switchover to a fuel containing a conventional scavenger and tricresyl phosphate has very little effect on preignition as shown in Fig. 2. The effect of phosphorous in the deposit after a number of engine operating hours is shown in Fig. 3. In this test the engine was operated under cruise conditions but checked for preignition limited i.m.e.p. every 25 hours.

Work in a single-cylinder normally aspirated engine using the wild ping counter developed by Ethyl Corp. has revealed similar results. These are shown in Fig. 4. The relative number of wild pings is an average of the wild pings per hour over a test period of 165 hours. It will be noted that the incorporation of tricresyl phosphate into the highly leaded fuel reduced the wild ping to less than that obtained on a fuel containing only a trace of lead.

Fig. 5 shows the average results of tests on a 1951 Buick and a 1951 Cadillac over 300 hours of operation. With the conventional fuel, knock increased as deposits accumulated resulting finally in preignition which progressed to the severe state. At the 150-hour mark tricresyl phosphate fuel was introduced into the engine and, after a relatively few hours of further deposit accumulation, preignition ceased and the knock was thereby reduced.

A rather large number of field tests have been run using tricresyl phosphate and the results confirm laboratory experience except it would appear that the laboratory tests are probably on the severe side.

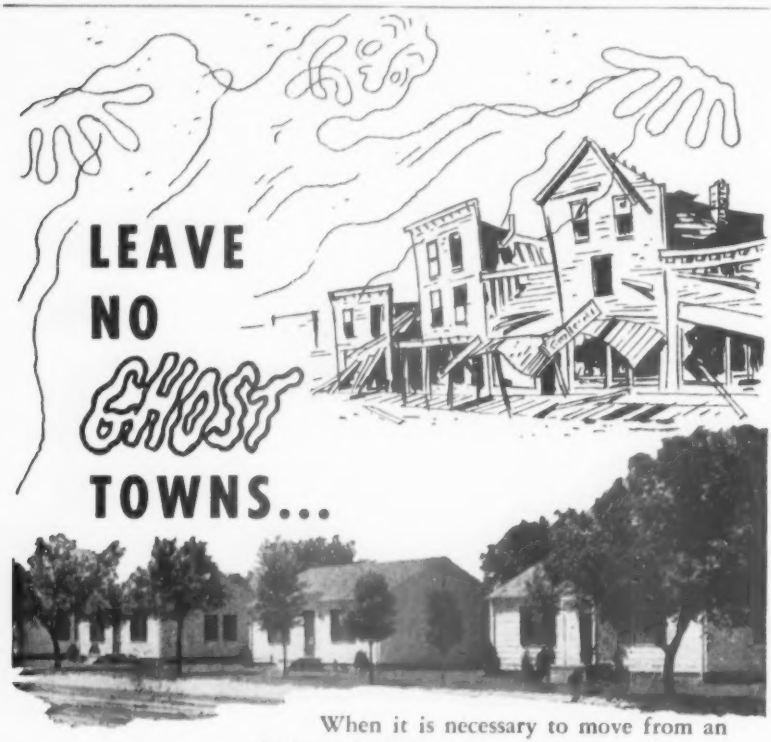
Again, in closing, we agree in general with the data presented by the authors on the preignition tedencies of fuel, on the effect of deposits inciting preignition, and that fuel additives can help control deposit-induced preignition.

Summary

The preignition phenomenon is threatening to limit further increases in compression ratio. Because of the increasing importance of this problem and the necessity for a solution, there is a great need for significant test methods acceptable to the industry.

The two important aspects of the problem are: 1, the tendencies of combustion-chamber deposits to glow and cause surface ignition of the charge; and, 2, the ability of fuels to withstand ignition by hot surfaces.

The glowing tendencies of deposits are dependent upon the rapid oxidation of carbonaceous materials under the catalytic infuence of metal salts. It is possible to hinder this reaction by suitable fuel additives, and this appears to offer a solution to the problem.



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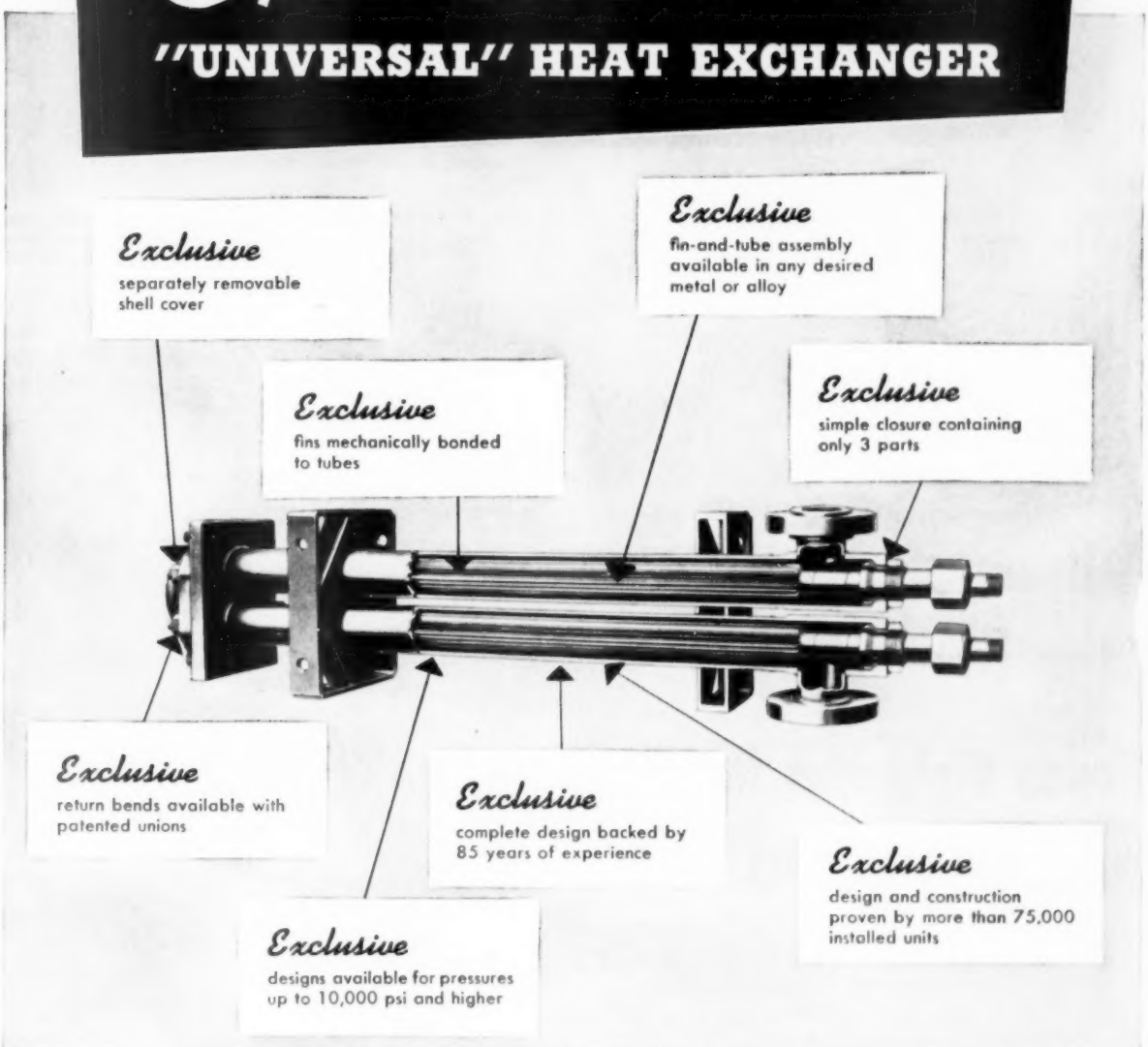
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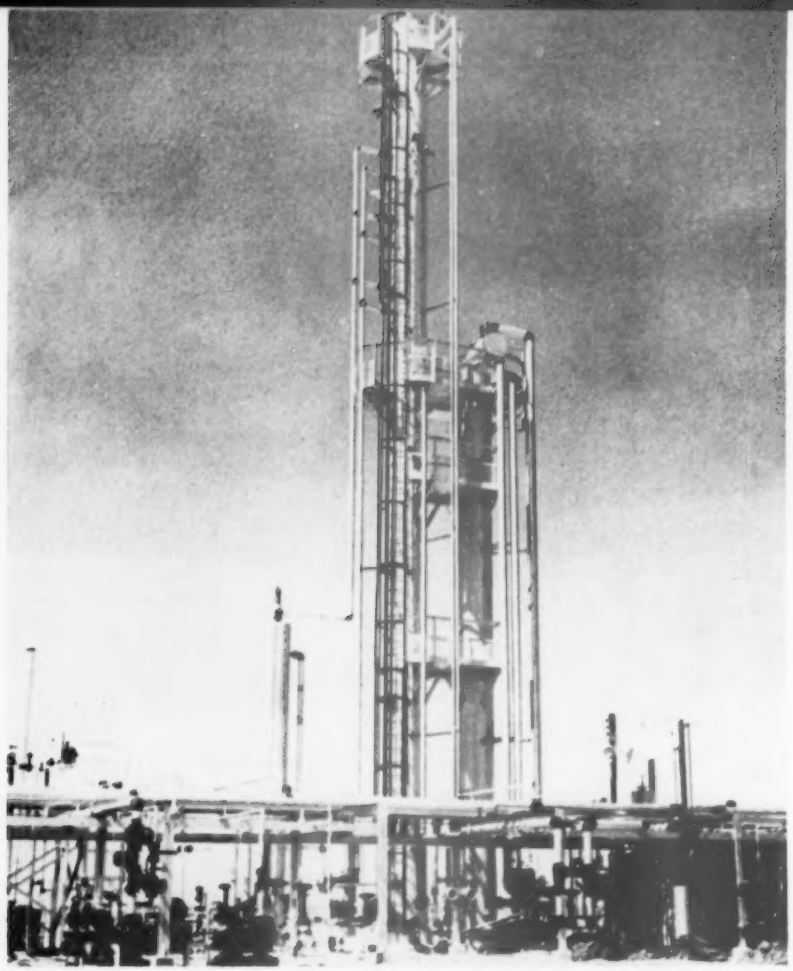


PROCESSING AREA. Control panel at lower right, with process towers in center. The tall tower is the depropanizer with the deethanizer at the right. The deethanizer tower is fitted at its top with a self-refluxing propane chiller.

PRODUCT STORAGE at Ropes field gasoline plant, totaling 100,000 gal. Natural gasoline, propane, or an L.P.G. mix can be handled.

Ropes Field Has Refrigeration Type Gasoline Plant

By Roy F. Carlson
West Texas District Editor

- Extraction of liquids by refrigeration.
- Minus use of electricity.
- Plant heating without steam.
- Virtually automatic operation with only three men in plant force.
- No absorption oil system.

All these features are incorporated in the Ropes Field Gasoline Plant, operated by Honolulu Oil Corp. for itself and Signal Oil & Gas Co. Hudson Engineering Co. was constructor on the plant.

Plant operation . . . Currently the plant is processing about 1,000,000 cu. ft. of gas per day with a total liquids extraction of 9 to 9.5 gal. per M.c.f. Gas is being taken from 14 wells now, with more wells being drilled. Plant capacity is now 1,900 M.c.f.; this capacity can be increased to 4,000 M.c.f. by addition of one more compressor.

Liquid-level and other types of controls are installed throughout the plant at points where damage to the plant or its equipment might occur. These controls are all connected into a central system and indicator board that signals the plant operator in the event of trouble, showing the trouble location and providing switch gear for shutting down and restarting plant equipment. This elaborate control system is installed to make up for the low manpower level.

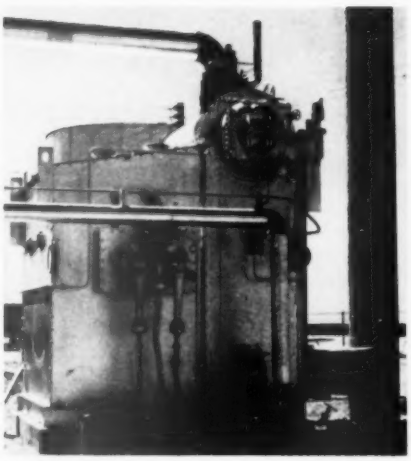
Only three men are in the operational force, with only one on duty at a time. Another man is at the plant to spell this operator and work a partial shift during the day. Plant operates unattended 8 hours per day. The third operator is provided as a relief for the first two.

A closed plant heat system utilizes a Dowthern unit with paracymene as the heating medium. Use of this unit makes it possible to operate the plant without a boiler man. The unit furnishes heat at 375° F. with only 11 psi. on the boiler, and it is the total source of plant heat.

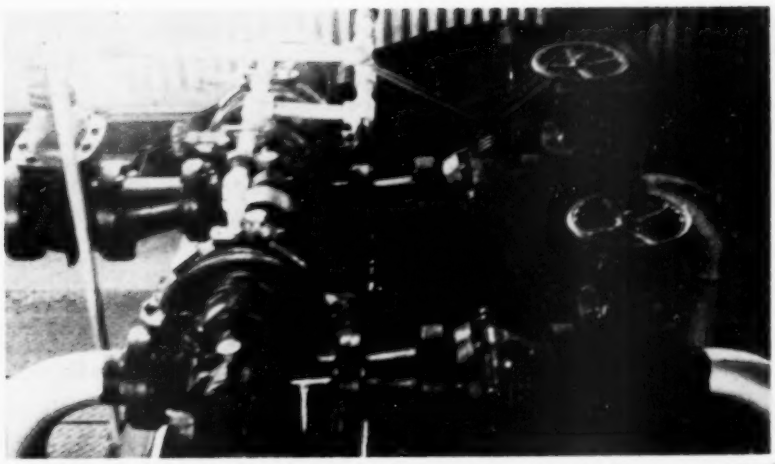
Plant suction is about 0 psig. with a process pressure of 500 psi. Compression is done by one compressor in three stages. A fourth stage on the compressor is used for compressing the propane in the propane refrigeration system.

Process flow . . . Briefly, the process consists of taking field gas through scrubbers for removal of entrained liquids, compressing it in three stages with scrubbing and air cooling after each stage, and sending the gas and all liquids to the processing system.

The gas and the total liquids are accumulated in one vessel where glycol is added to prevent freezing. After some cooling in a heat exchanger, the total inlet material goes to the propane chiller and then to an accumulator where sales gas is separated from the raw product and where the glycol and any water are trapped out.



PLANT HEAT is furnished through this Dowtherm unit using paracymene. Heating unit operates at only 11 psig. at 375° F.



WATER PUMPS and the cooling tower fan are driven through this arrangement of sheaves. The driving compressor engine is at the right of the photo. A jack system at the rear of the photo provides for adjustment in sheave position.

The raw product is then transferred, after further heat exchange, to the deethanizer tower. This tower operates at about 480 psi. and is fitted at the top with a propane-chilling unit at its top which operates with self-induced propane reflux at about 38° F.

The deethanized raw product is sent to the depropanizer tower. This vessel is temperature controlled at its top to make specification propane and L.P.G. mix through a side draw, and specification natural gasoline at the tower bottom.

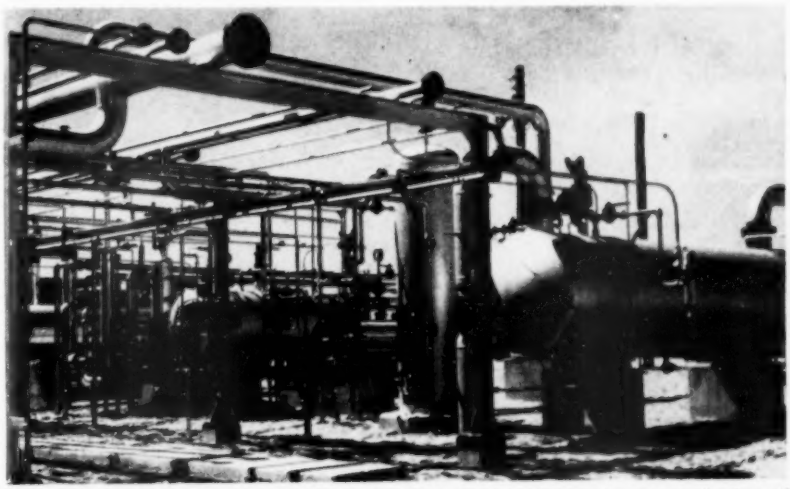
All products made in the plant are designed primarily for local consumption. Product storage includes 40,000 gal. of natural gasoline, 40,000 gal. propane, and 20,000 gal. of L.P.G. storage. All products are loaded out by truck. Residue gas goes to West Texas Gas Co. for sale through its nearby distribution system.

The super control system installed in the plant not only keeps required manpower to a minimum, but control on the raw product is such that the liquid load to the fractionation system varies less than 10 per cent during a day.

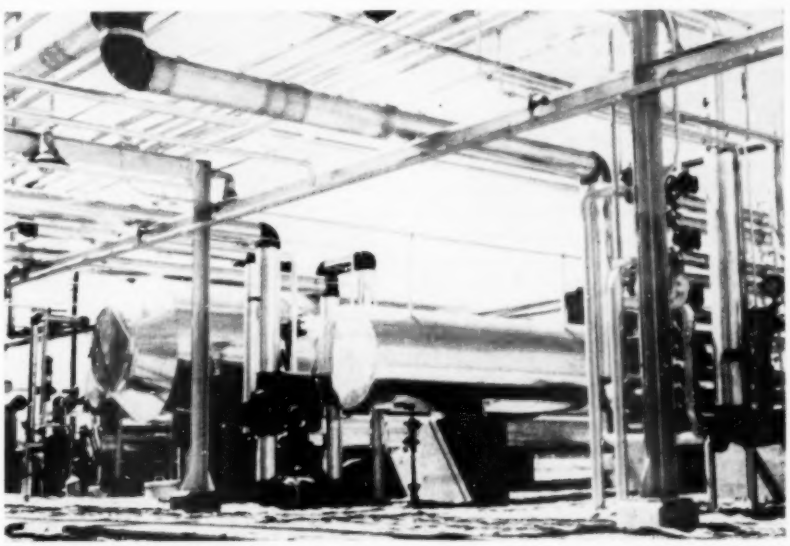
All plant pumps are steam-type in the process area, these being driven by gas. Residue gas at 500 psi. is reduced to 150 psi. for pump use. Exhaust gas from the pumps is burned in the plant fuel system.

Engine-cooling water is cooled in a small induced-draft cooling tower. The fan is belt driven from the compressor engine through an extension shaft and universal joint. This same belt system drives cooling-water circulating pumps.

The only electricity needed in the plant is supplied by the rural power system, and is needed only for lighting, starting a compressor, and truck-loading pump.



INLET SCRUBBER, fuel-gas scrubber, heater for pump gas, heat exchangers, and other of the process vessels are shown here.



REFRIGERANT HEAT-EXCHANGE equipment, the raw-product chiller, and the raw-product accumulator are shown here. Total raw product enters the accumulator, with sales gas being separated here.

CHECK THESE REASONS . . .

Why Contract Your Drilling Work?

- You get the benefit of unlimited flexibility
- You get the services of experts, of specialists
- You save on capital invested in expensive equipment
- You save on executive, supervisory, and accounting expense

by A. H. Bell*

FIRST and most important advantage that an oil company derives from contracting its drilling work is greater operational flexibility. The volume of work that may be performed for any oil operator during specific periods of time is increased and the types of equipment and experience that are available for different kinds of operations and conditions are more extensive.

An oil company, having its own drilling department, and drilling wildcat and development wells throughout any particular area over a period of time, must purchase equipment and train personnel to man outfits varying in size from 3,000-5,000-ft. rigs, up to the 15,000-20,000-ft. rigs. It might also at times find half of its rigs idle and still have to buy other rigs of different size or type to carry on a large development program in a new field. Actually, it would be required to carry an equipment inventory big enough to take care of its maximum need, and simultaneously would have a fluctuating personnel requirement that would be both difficult and expensive to control.

Contractors Usually Specialists

On the other hand, individual contractors usually specialize in the certain types and depths of drilling with which they are most familiar and most successful. They bid largely on their particular type of work wherever it may be located and thereby keep reasonably busy though they may work alternately for many different oil companies. Under this system they get the maximum amount of work from their rigs, reduce labor turnover, and show lower costs which in the long run results in lower drilling prices for the oil companies.

* President, Bell & Burden, Inc., Los Angeles, Director, American Association Oilwell Drilling Contractors. Paper presented at spring meeting, Pacific Coast Production district, Los Angeles, June 1953.

Rig Situation, Pacific Coast

Recent reports indicate 179 rigs operating steadily on the Pacific Coast and 90 per cent of these, or about 162, are contract rigs. A large rig in the 15,000-20,000-ft. class costs today, with drill pipe about $500,000, while the 3,000-5,000-ft. rig costs about $150,000. Most of the rigs in California probably fall in the 7,500-10,000-ft. class and a fair estimate of the average rig replacement cost in California including yards, is $350,000.

The 162 contract rigs operating in California, therefore, have a combined capital value of $56,700,000. This investment in tools and machinery amounts to $16,666 per worker which is substantially higher than the $12,000 average per worker for all southern California industry as recently reported by the National Association of Manufacturers. If the oil companies ran their own rigs they would no doubt have a combined investment at least 25 per cent larger than this due to flexibility requirements, or over $70,000,000. Thus, by contracting their work they are saving a considerable amount of capital investment which could be used to better advantage elsewhere.

Drilling employes . . . The average drilling rig requires 20 men, working 6 days on and 2 days off. Some small rigs work four-man crews totaling 16 men per rig, but large rigs often have mechanics, welders, truck drivers, and safety men so it is reasonable to figure an average of 21 men per rig, including the tool pusher. These 162 rigs, therefore, employ a total of 3,402 men that would otherwise be on oil-company payrolls, and the figure for the oil companies would probably be larger due to the necessity of carrying men between wells and other payroll overburdens. By contracting, the saving to the oil company in executive, supervisory, and accounting expense, and in pension and other fringe benefits is, therefore, quite substantial.

Progress Among Drilling Contractors

I have spent most of my life with major oil companies, and now being in my seventh year as a drilling contractor, feel qualified to state the following without giving offense to anyone. The contractor's men, fully aware of the relatively limited means of their employers as compared to the oil companies realize subconsciously that they must concentrate a little harder in order to survive. The personnel of the relatively small contracting firms have built up a friendly rivalry among themselves under our free economy, and the highly competitive conditions of the contracting industry have brought out all the ingenuity of the contractor to improve his methods and equipment as a means of survival. These various factors have promoted tremendous improvement in drilling methods and results in the past few years. With the very rigid engineering specifications for mud, directional drilling, and other technical aspects of drilling in most contracts of today, the old claim that the contractor made hole at the expense of end results is no longer valid.

The contractors, as a group, acting through the American Association of Oilwell Drilling Contractors, are constantly attempting to improve their service to the oil companies. In cooperation with various state universities, classes and courses are conducted in most important drilling districts on drilling mud, safety, and drilling techniques. Committees work actively on insurance, transportation, safety laws and regulations, taxes, accounting, etc.

Oil companies' rigs . . . It should be stated, however, that it is to the advantage of the larger oil companies to run a few rigs of their own for several

reasons. The company rigs serve as a means of training personnel for drilling supervision and offer the companies that are financially able an opportunity to experiment on new equipment and methods. The outgrowth of these experiments when turned over to the contractors eventually result in lower drilling prices. Another advantage is that the use of company tools allows the operator to keep fully acquainted with drilling costs and to check the contractor's prices, on either the high or low side.

Day work . . . In the past there has been some criticism of contractors by persons not intimately acquainted with well conditions, on the ground that progress slows down when a well goes off footage onto day work. In answer to this it may be said first, that any contractor who knowingly would allow this to happen is not worthy of his hire, and second, it is extremely doubtful if this criticism is justified because the average drilling crew is not advised of the terms of payment on a job. The real reason for an apparent slowdown is that the normal job is only taken on footage down to the point where trouble or delay is anticipated, so naturally the day work seems unproductive of results.

On wildcat contracts, which usually must be on day work due to anticipated risks or lack of information, a great deal of suspicion or friction would be eliminated if operators as a whole would use the modified day rate, which has been successfully developed by one or two of the large companies. Under the modified day rate the contractor bids a day-work price, which approximates actual cost, plus a price per foot aggregating a total fixed profit. This form of contract provides a strong incentive feature since the contractor obtains no profit unless he makes footage, and thus there is no basis for suspicion of his motives.

Footage . . . Another function of the contractor that is beneficial to the operator is the drilling of wells on a footage basis. There is no other business as hazardous as the oil-well-drilling industry and the contractor absorbs the shock of disastrous jobs, giving the operators uniform costs which makes their budgeting decidedly easier and relieves them of the unpleasant task of explaining overruns caused by fishing jobs or other delays. Very few people realize that the contractor in reality is underwriting the hazards of drilling just as the large insurance companies underwrite fire, storm, or liability hazards. One usually thinks of a small company protecting itself from unusual hazards by insuring with large and financially strong companies but in this case the large oil companies are insuring with the small, independent contractors who are giving more service thereby than just the construction aspects of providing equipment and digging a hole.

Help From Operators

Due to the fact that the contractor is a responsible and experienced driller of wells, operators should give him greater freedom of action, fewer limitations, more responsibility, and let him assist in the development or modification of well programs, such as straight-hole requirements, mud requirements, and directional drilling, with the idea that this sort of cooperation should result in better performance and lower costs which can be passed on to the operator.

Oil companies could help drilling contractors, and at the same time reduce over-all well costs, by planning locations with as much continuity as possible. Frequently it is practicable to plan far enough in advance of actual drilling to give a well-to-well program to an area. This obviously would save money for both the company and contractor.

Tour reports . . . One big problem for the contractor is involved in the filling out of the oil company's tour reports. Each contractor has his own tour report form which, in most cases, is used for payroll data as well as for drilling data. The driller fills out this form and then has to transfer the information on to the operator's form which will de quite different in appearance and information required. Obviously oil-well drillers are seldom of the engineering or bookkeeping temperament or training and as a consequence there are frequent errors or misunderstandings in setting forth the information the operator requests and in the form desired. A drilling crew might finally become proficient in filling out the forms of one operator and then have the rig move to the property of another oil company with an entirely different type of report.

Another situation that causes confusion and misunderstanding for the contractors is the wide variation in drilling contracts as to form and context. The A.A.O.D.C. has recently adopted a standard drilling contract which has been well received in the Texas - Mid-Continent area. Eleven thousand copies of this contract have been sold in the past few months. While it is not proposed that this form is entirely suitable for California, it shows that agreement on standardization can be reached among a large group of people with diverse interests.

During recent years the method of requesting bids for day work "with drill pipe" and day work "less drill pipe" has become common practice. Except for jobs where unusual conditions are expected, all drilling contracts could be awarded on the basis of only one day rate and the situation thus be greatly improved.

There is constant difficulty between the operator's field forces and the contractors in determining when the with-drill-pipe or less-drill-pipe rate prevails. In some cases it has descended to the level of quibbling over a time increment of 15 minutes. With a single day rate the contractor's bid would naturally take into account the average between the "with" or "less" drill-pipe rates. Much lost time for both the operator and the contractor in interpreting tour reports and making invoices in minute detail would thereby be eliminated.

The California mechanics lien law provides for a 30-day deadline for filing liens on property to satisfy a contractor's unpaid bills and the custom has grown of holding back 20 or 25 per cent of construction charges for 35 to 45 days as protection against liens.

For the normal shallow fast drilling wells this is no hardship for the contractor, but if he drills a well that takes 180 days he may have as much as $50,000 frozen for from 35 to 45 days after the well completion. A contractor running several or more rigs will find he has a very substantial amount of working capital tied up unproductively. Some companies, however, help the contractors by making progress payments on deep wells each month.

Finally, the operators can help to improve the contractors' efficiency by letting multiple well contracts wherever possible and by standardizing on contract methods and forms, including work-progress reports, and by simplifying and expediting payment procedures.

"On wildcat contracts, which usually must be on day work due to anticipated risks or lack of information, friction would be eliminated if operators would use the modified day rate which has been successfully developed."

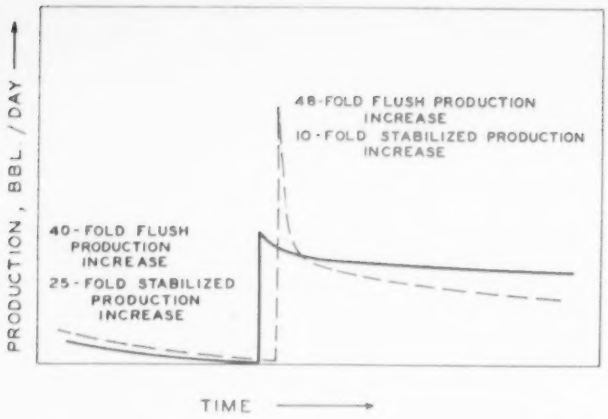


Fig. 1—Comparison of stabilized and flush production increases.

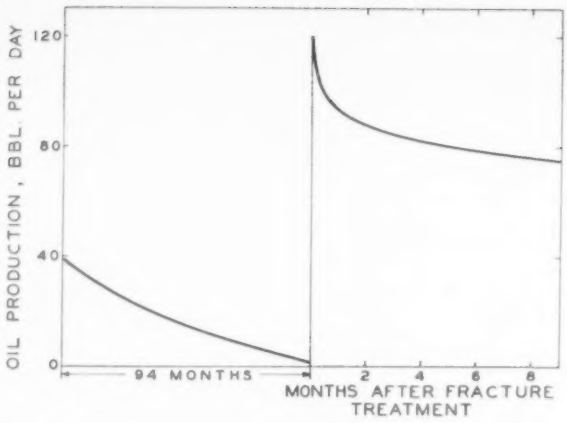


Fig. 3—Fracturing results of well having local permeability block.

Have You Tried Hydraulic Fracturing . . .

to increase production?

Hydraulic fracturing may be used for:

1. Increased drainage area.

2. Break through permeability blocks at well bore.

3. Break through to a permeable oil-saturated zone.

Best results generally can be obtained when fracturing sandstones or conglomerate formations, and sometimes limestones and dolomites.

Viscous crude and refined oils have recently been widely accepted as fracturing fluids. In addition to the decreased treating costs, improved results have been obtained with these oils.

Better results have been obtained when conducting treatments through perforations in casing than when treating open-hole sections. It is believed that this is because multiple fracturing occurs when treating through perforations, whereas only one fracture generally results from treating an open-hole section.

by Roscoe C. Clark, H. G. Freedman, J. H. Bolstad, and H. F. Coffer

IT is presently believed that hydraulic fracturing creates in a formation a crack or fracture which can be used as a drainage channel for oil or gas to enter a well bore at a more rapid rate. Fractures are created by applying sufficient hydraulic pressure in a well to rupture the formation surrounding the well bore. These fractures may then be extended some distance away from the well by injecting fluids into them at a rate in excess of the rate at which the fluid will be lost to the formation.

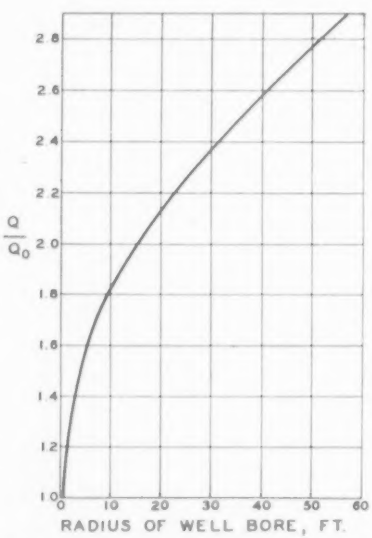


Fig. 2—Effect on producing rate of enlarging a 6-in. diameter well bore.

Responses to hydraulic fracturing are usually characterized by a large flush production which occurs immediately after the job, followed by a rapid decline in rate of production during the next 30 to 60 days, after which the producing rate stabilizes into a normal production-decline curve. This behavior is probably caused by the rapid recovery of the oil in the formation immediately adjacent to the fracture. By the time this oil has been recovered, a normal producing rate is attained which should continue throughout the remainder of the life of the well.

Hydraulic-fracturing results are frequently reported in terms of this flush production. This type of reporting is frequently misleading, inasmuch as the initial increase in production is no indication of the increase represented by stabilized production. Fig. 1 illustrates this point by two wells, one of which indicated a 48-fold increase in production immediately following a fracturing job. This rate rapidly declined to a stabilized increase of only 10-fold. The other well responded with a 40-fold increase in flush production, declining to a stabilized producing rate repre-

Authors with Continental Oil Co., Ponca City, Okla. Paper presented at A.P.I. spring meeting (1953), Rocky Mountain District, Division of Production, Casper, Wyo.

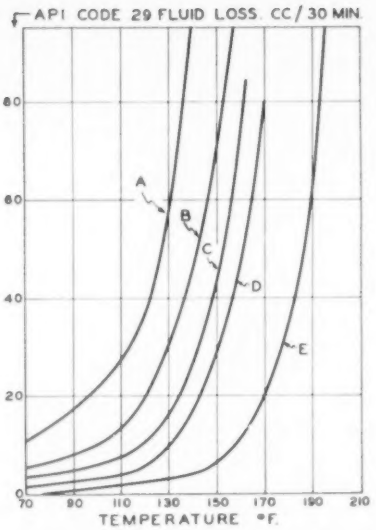


Fig. 4—Typical fracturing oil fluid losses.

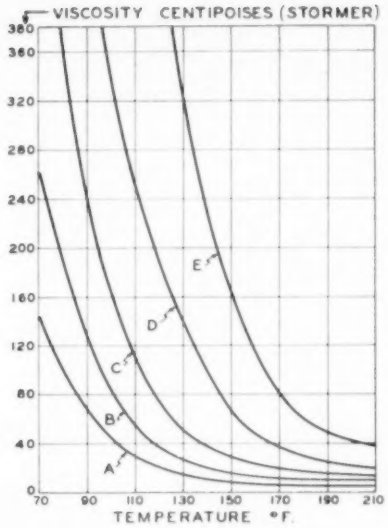


Fig. 5—Typical fracturing oil viscosities.

senting a 25-fold increase in production. Although the results obtained in the latter case were much better, improper reporting might indicate that a more successful job had been obtained in the former case. When ascertaining results of fracturing jobs, the stabilized production, as well as the flush production, should always be determined.

There are three mechanisms by which production may be increased by hydraulic fracturing. These are:

1. Increase in drainage area.

2. Break through permeability block in the immediate vicinity of the well bore.

3. Break through low-permeability formation into a zone of high permeability.

If there is no permeability block in the immediate vicinity of the well bore and if the well is drilled into a zone of average formation permeability, then the production increase obtained will be directly related to the amount of the additional drainage area produced by the formation of the fracture. At present no method has been devised for calculating the production increase to be expected from this type of an enlargement of the drainage area.

Fig. 2, however, illustrates the increase in production which might be expected from various well-bore enlargements. It may be seen from Fig. 2 that increasing the diameter of a well bore from 6 in. to 60 ft. should increase fluid production by a factor of approximately 2.4, or 140 per cent. This should be considerably greater than that to be expected by creation of a crack or a fracture extending for a distance of 30 ft. from a well. This degree of increase should be expected regardless of the magnitude of the permeability of the formation as long as the permeability is fairly uniform and does not increase a short distance away from the well.

If the permeability near the well is considerably less than it is a short distance away, then a considerable increase in production may be expected as a result of hydraulic fracturing. The lower permeability around the well may be a result of local plugging effect resulting from the type completion, or merely the result of having drilled into a zone of low permeability, much lower than the average permeability of the formation. In these cases production may be increased considerably by the application of hydraulic fracturing.

Example . . . This type of increase in production can be illustrated by a well in the Wichita Falls area which, 5 months after the date of completion and prior to hydraulic fracturing, was producing approximately 3 bbl. per day, pumping. The flush production on the well, immediately after the fracturing job was approximately 500 bbl. per day flowing through a ½-in. choke. One year later one well was still producing 56 bbl. per day flowing through a 10/64-in. choke.

Another good example of breaking through a locally impermeable zone in the vicinity of a well bore is a well completed in a sandstone formation in the Wichita Falls area which produced 40 bbl. per day upon completion. Approximately 8 years later the well had declined to 3 bbl. per day, pumping. A hydraulic-fracturing job resulted in a flush production of 118 bbl. per day which had declined after approximately one year to 75 bbl. per day, a production rate almost double that 9 years ago at the completion of the well. The production history of this well is illustrated in Fig. 3.

It is sometimes difficult to predict by the behavior of a well whether there is a local zone of low permeability in the immediate vicinity of the well or whether the formation as a whole, or extending a distance from the well bore, is generally of low permeability. If the former condition exists, then a large increase in production may be expected as the result of the formation of a fracture; whereas if the latter condition prevails, a production increase in the neighborhood of 100 per cent is all that can be expected. In distinguishing between these two effects, the pressure-buildup test, as described by A. F. van Everdingen in a recent paper,[1] should be very effective provided the test conditions in the well are favorable.

Probably the most important factor which will insure the success of a hydraulic-fracturing job is the presence of some bottom-hole pressure. It is difficult at this time to delineate the pressure above which good jobs will occur and below which mediocre or poor results will be obtained. However, with little or no bottom-hole pressure, little or no results from fracturing can usually be expected. From an operational point of view, probably the best results will occur in the cases where it is found that a well will produce little oil. However, upon being shut in for several days, it will build up to a fairly high fluid level. This type of well can be detected by an examination of producing records. Such a well may consistently pump off, producing only a small amount of oil each day; and if shut in, due either to pump failure or some other trouble, after resumption of production it will recover nearly all of the oil lost during the shutdown time.

Jobs to Avoid

A number of conditions may make a hydraulic-fracturing job inadvisable. Included among these is a poor primary cementing job which will allow the fracturing materials to channel up the side of the pipe; exposed shales, particularly laminated type which would probably fracture first either in the shale or in the sand-shale interface, resulting in little or no increase in production; high gas-oil ratio or high water-oil ratio which might be made even higher by fracturing; future secondary-recovery operations which may in some cases make fracturing inadvisable; well equipment in poor condition and unable to withstand the high pressures necessary for successful hydraulic fracturing; and laminated-type formations containing shale streaks. Good results are sometimes obtained from this latter type of formation.

However, the over-all percentage of successful fracturing jobs is low. Soft sandstones also, such as are frequently encountered in the Gulf Coast area, do not normally respond favorably to hydraulic fracturing.

Formations Responsive to Fracturing

Experience has indicated that nearly all types of formations will respond to some degree to hydraulic fracturing. **Sandstones** appear generally to produce the best results followed by conglomerates, dolomites, and limestones. This is probably because sandstones, more than any of the other three, contain clays or other materials which swell when contacted by drilling-mud filtrate water, producing a local permeability block in the vicinity of the well bore. Subsequent fracturing operations will then produce a much better result than if the plugging had not taken place. Sandstones also appear to have a more uniform-type permeability than the other three, which produces better drainage channels into the fractures.

The permeability of **conglomerates** appears in some cases to be partially blocked because of drilling mud or of well-completion practices; and, in addition, conglomerates are frequently so nonuniform in nature that a well may be drilled into a locally relatively impermeable zone. In either case a hydraulic-fracturing job should produce good results.

Limestones and **dolomites** may respond favorably to fracturing. However, the results are frequently no better than could be obtained by the use of muriatic acid. Thickened acids have sometimes been found to be effective for fracturing limestones and dolomite formations.

Dolomite example . . . One case of considerable interest was experienced with six wells completed in a dolomite formation. These wells were shot with nitroglycerin upon completion. After a number of years, production had declined to the point where some type of stimulation was considered necessary. Acidization with several thousands of gallons of muriatic acid failed to increase production. The wells were then fractured using a thickened hydrochloric-hydrofluoric acid mixture. In all cases the production was increased an average of 500 per cent. (This flush production declined in 8 months to an average increase of 60 per cent; however, a profit was obtained from the jobs.)

Selection of Fractionating Fluids

The fracturing fluids which are generally available consist of gelled light crude oil or kerosine, acid-kerosine emulsions, and viscous crude or refined oils. Information is presently available on the characteristics of the former two fluids. However, no data have been published on the characteristics of thick or viscous oils.

Thick oils are becoming increasingly popular for use as fracturing fluids. Included among the thick oils which have been used for fracturing fluids are bunker fuel oils obtained from various refineries, viscous crude oils, and even tank bottoms. These thick oils range in viscosity from approximately 20 cp. to in the neighborhood of 1,000 cp. under varying bottom-hole temperatures. Although these viscosities are somewhat lower than are normally used in other fracturing fluids, it is believed that the property of viscosity for fracturing fluids has been somewhat overemphasized in the past, inasmuch as the extension of a fracture depends upon the resistance of a fracturing fluid to enter the formation porosity.

The property of fluid loss, therefore, rather than that of viscosity should be the foremost consideration when selecting fracturing fluids which will be the most effective for extending fractures. When evaluating fracturing fluids, it is preferable that the fluid loss measurements be made through permeable sandstone. However, it has been found that the A.P.I. RP 29* fluid-loss test for drilling muds will duplicate sand filtration results sufficiently to provide adequate comparative results for thick-oil fracturing fluids. It has been found that many thick oils resist movement into porous media to an amount considerably in excess of that which would be expected considering only the property of viscosity. Fig. 4 illustrates the A.P.I. RP 29 fluid loss exhibited by four typical bunker-fuel oils at various temperatures. These fluid losses at some temperatures compare favorably with those demonstrated by good drilling muds.

In addition to the decreased costs of thick-oil fracturing treatments, it has been found in areas investigated that improved results can be obtained with this type of treatment. For example, in the Wichita Falls area, in treating both sandstone and conglomerate formations the average production increase using thick oils was 380 per cent, whereas the average percentage increase obtained using a prepared fracturing fluid was only 140 per cent. These figures are based on all of the wells which can be evaluated to date, excluding new wells on which it is difficult to evaluate production prior to fracturing.

*A.P.I. RP 29: Recommended Practice for Standard Field Procedure for Testing Drilling Fluids (Tentative), A.P.I., Dallas, May 1950.

The production increase listed in both cases is the increase realized after the rate of production has been stabilized, and it does not represent the flush production immediately following the fracturing job. Although a number of factors other than the type of fracturing fluid used would influence the production increases obtained, nevertheless the difference between the results is so great that, at least for this area, a preference for thick-oil fracturing fluids is indicated.

When thick oils were first introduced as fracturing fluids, it was believed that, because of their inability to break down to thin fluids, the use of these oils would be restricted to those formations which had sufficient bottom-hole pressure to flush the thick oil back out of the formation. However, there have been a number of instances indicating that a high bottom-hole pressure is not necessary to obtain good results with thick-oil fracturing fluids. For example, two wells fractured in Howard-Glasscock field, Texas, where there is almost no bottom-hole pressure, responded one with a 100 per cent and the other with 200 per cent increase in production.

It has been found that the characteristics of thick oils vary considerably from oil to oil. Therefore, when selecting oils for use as hydraulic-fracturing fluids, it is desirable to select the oil having the most desirable hydraulic-fracturing characteristics; and care should be exercised that harmful results will not occur from the treatment. Thick oils to be selected for use as hydraulic-fracturing fluids should, for best results, possess the following properties:

1. Low fluid loss.
2. Low viscosity.
3. Little or no tendency to emulsify with water.

Considering fluid loss, it can be shown that, if a fracturing fluid has a zero fluid loss across the face of the formation being fractured, then all of the fracturing fluid can be used to form fractures; and no fracturing fluid will be lost to the porosity of the formation on either side of the fractures. The higher the fluid loss becomes, the more fluid will be lost to the formation; therefore, the less fracturing which can be obtained for the same volumes of fluids. It can be seen from Figs. 4 and 5 that the proper selection of each of the five oils illustrated will enable the utilization of a fluid loss less than 17 cc. per 30 minutes without the viscosity exceeding 100 cp.

If a fracturing fluid has low fluid-loss characteristics, then it is desirable to maintain a viscosity as low as possible in order to be able to easily

(Continued on page 92)

Here's a boiled-down version of its duties . . .

The New Mexico Oil and Gas Engineering Committee prepares monthly statistical reports on all oil and gas pools in the state. These reports include such information as oil, water, and gas production; gas-oil ratios; dry-gas production and distribution; distillate production; dual completions; gasoline-plant intake and distribution of gas and products from these plants; and completions of new producing wells.

And now, learn . . .

A carbon-black plant report includes the amounts of gas used and black produced. Results of remedial work with oil wells, before and after production of oil and water; bottom-hole pressures; and results of gas-oil ratio tests are also included in the report.

A report covering the New Mexico Conservation Commission, and its operating rules and regulations, was published in June 8, 1953, issue.

How the New Mexico Oil and Gas Engineering Committee Performs Its Functions

by Roy F. Carlson
Midland Editor

ON July 10, 1953, the organization now known as the New Mexico Oil and Gas Engineering Committee will celebrate its twenty-third birthday. It had its beginning in Hobbs field, the first big oil in New Mexico, and it now represents nearly 90 per cent of the oil and gas produced in the entire state. At its start it had a paid staff of 2 people—12 people are employed now.

The beginning group was organized by operators as the Hobbs Pool Proration Committee, a voluntary proration group formed prior to enactment of state-wide oil and gas laws. It was formed under a law enacted in 1929 that permitted such groups to function in pools where producing ability of a field was larger than transportation available to move oil out of the field.

Following enactment in 1935 of state-wide oil and gas regulations covering proration problems, and after discovery of other large oil fields in southeastern New Mexico, the group was enlarged and changed in scope to cover all of Lea County. This organization was called the Lea County Operators Committee, and had as its function the collection, compilation, and distribution to members of engineering and statistical data on oil and gas fields in Lea County.

The latest reorganization followed in October 1950. This current organization—the New Mexico Oil and Gas Engineering Committee—is nearly the same as the Lea County group, but its scope is much wider, covering all oil and gas pools in the state. Its function as described in its bylaws is to obtain, coordinate, and disseminate to participants factual engineering data and statistics pertaining to oil and gas pools in the State of New Mexico and the production therefrom.

Participation in the group is open to any individual or firm engaged in the actual production of oil or gas in the State of New Mexico, upon proper signification of intent and payment of assessments as determined by the bylaws. Each member of the group is entitled to one representative on the general committee. Only those firms or individuals engaged in the actual producing operation itself are permitted to participate, or receive copies of reports.

If a member ceases to be a producer in the state, or if he defaults for 30 days in the payment of assessments he automatically ceases to be a participant. Withdrawal from the group may be had upon 30 days' written notice to the chairman, but neither voluntary nor involuntary withdrawals relieves the participant of the obligation to pay assessments up to the withdrawal date.

General Committee

Membership of the general committee is composed of a representative of each of the participants of the group—one representative from each of the 136 member companies or individuals that comprise the group. Regular meetings of the group are held annually during the fourth quarter of each year, with such special meetings as may be necessary.

Only matters of broad policy and others of a similar nature are brought before the entire general committee. One of these is the annual election of some of the members of the executive committee which is actually the directing or administrative group of the organization.

Executive Committee

There are 9 members of the executive committee, 5 of whom are elected from the top 15 producers in the State of New Mexico, and 4 of whom are elected from the remaining producers. Size of the producers is determined from oil and gas-well gas runs as reported to the New Mexico Oil Conservation Commission figuring 50,000 cu. ft. of gas as equivalent of 1 bbl. of oil.

Although the general committee and other subordinate groups cooperate fully with state and federal regulatory bodies and other agencies, and furnish data to participants, it does not appear in any capacity at any hearing of the governmental agencies. Its function is one of statistical work, not of an advisory or engineering opinion nature.

Members are elected for 2-year terms with five places being filled on even-numbered years and four in odd-numbered years. The election takes place at a meeting of the general committee, prospective executive committee members being chosen from a

group picked by a nominating committee or nominations made from the floor at the meeting. The nominating committee is composed of three or more members of the general committee who are not on the executive committee.

Officers of the executive committee are elected by the members of that committee immediately after their election by the general membership. The committee meets once each 6 months at regular meetings, and at such special meetings as may be called by the chairman, secretary-treasurer, or written request of one of the members of the committee.

Term of office for the executive committee officers is for 1 year. The chairman appoints the members and the chairman of all subcommittees of the executive committee and is an ex-officio member of all such committees except the nominating committee.

Committee Direction

To implement the function of the executive committee, a full-time director is employed, along with such other clerical, engineering and administrative personnel as are needed. Director of the organization is Glen Staley, who has been with the committee since its beginning in 1930. He is assisted by George H. Hirschfeld, petroleum engineer; W. H. Vaughn, statistician and office manager; and E. D. Bennett, bottom-hole-pressure operator. A total of 12 people are on the employed staff at present, all of whom are located in Hobbs.

To further assist in carrying out the functions of the organization, a field engineering advisory committee is established at which the director presides. This committee meets each month. Out of this group special and pool committees are formed that work on specific pool problems. Membership in these committees is restricted, of course, to participants in the general committee, with the chairman being furnished by the largest operator in the pool.

Although these special pool committees work on specific pool engineering problems, results in any of these studies are not made public and are not published by the general committee, being confined to members of the special pool committee. These meetings, however, are called and directed by the director, and minutes assembled by the director's staff.

Report Preparation

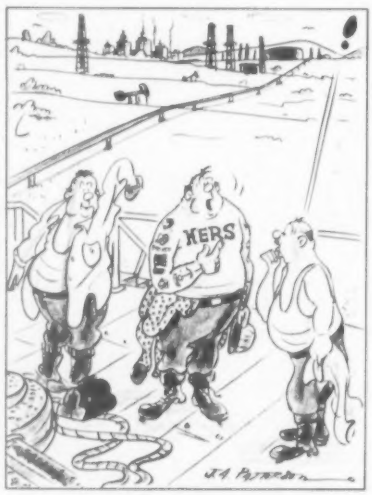
Each month the permanent staff of the general committee prepared, under the direction of the director, statistical reports on all oil and gas pools in the state. These reports are distributed to the various members with the stipulation that they are not for public release or general publication. Most of the statistics are obtained from reports submitted to the New Mexico Oil Conservation Commission.

The monthly reports include such information as oil, water, and gas production; gas-oil ratios; dry-gas production and distribution; distillate production; a dual-completion report; gasoline-plant intake and distribution of gas and products from these; and a completion report on new production wells. A carbon-black-plant report including the amount of gas used, and black produced is published. Results of remedial work with data before and after and as to production of oil and water; bottom-hole pressure, and results of gas-oil ratio tests are also included in the monthly report.

An annual report in two volumes is also published, with summaries of the information in the monthly reports, and production charts plotted against time of gas, oil, and water. Where possible the information in both the monthly and annual reports is given by wells, by pools. Some 132 separate pools are included in the reports.

Committee Financing

Assessments are made on the various participants in the committee to defray operating expenses of the organization and to maintain a working fund. Amount of a participant's assessment for a month is in the same proportion to total assessments as the participant's oil or gas production is to the total oil or dry gas production in the state. Gas production is reduced to an equivalent volume of oil by taking 50,000 cu. ft. of gas as equal to 1 bbl. of oil.



"She got th' idea from towels."

The total general assessment for a month equals the total expenses payable during the month plus any amount deemed necessary to maintain a proper working level of funds. Any special expense incurred that does not affect all operators is defrayed by assessment of the operators affected. Present cost of operation is about 1½ mills per barrel of oil produced.

Each year the director prepares a budget of expected expenditures of the organization which is subject to approval or modification by the general committee. A budget for the second half of each year is also prepared and must be approved by the executive committee. Expenditures greater than $500 must have the approval of the executive committee whether budgeted or not.

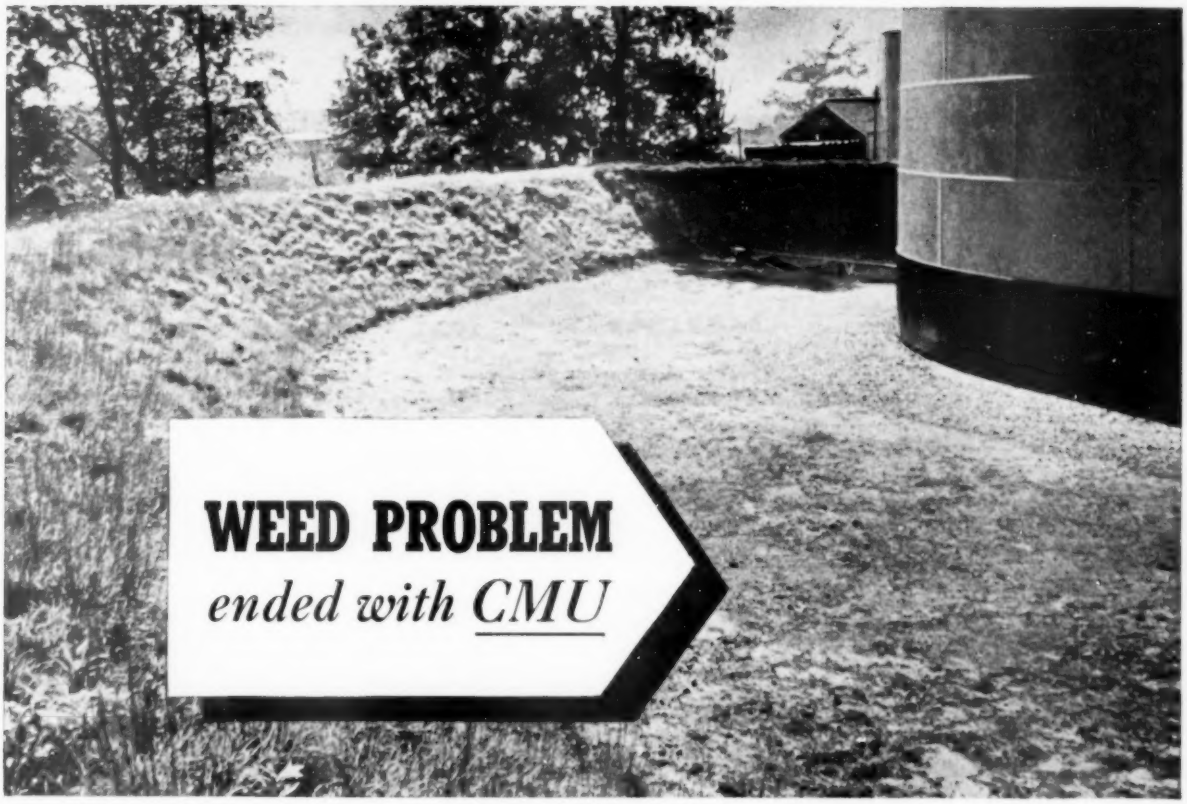
All officers and the director must be bonded at the organization's expense. All expenditures, except for salaries, must be substantiated by invoices or receipts. Monthly reports of receipts and expenditures are prepared by the director and are subject to approval of the officers of the executive committee. Books of account must be kept by the director of the organization, and these must be audited once a year.

Amendments may be made to the bylaws by a meeting of the general committee after a proposed change is first reviewed by the executive committee. A two-thirds majority of a quorum of the general committee must ratify an amendment before it is approved.

Bottom-Hole Pressure Surveys

A bottom-hole-pressure subcommittee determines which fields will be surveyed. At the present time, due to the increased activity, key well surveys have been instituted in the older fields. The subcommittee selected key wells to cover particular fields on which there were good pressure histories and in doing so released the bottom-hole-pressure unit to make surveys in the newer fields.

Current executive committee of the New Mexico Oil and Gas Engineering Committee are: J. E. Low, chairman, Amerada Petroleum Corp., Tulsa.; C. R. Bickel, vice chairman, Shell Oil Co., Hobbs; C. C. Wilson, secretary-treasurer, Continental Oil Co., Hobbs; E. E. Merkt, Jr., Gulf Oil Corp., Fort Worth; J. W. House, Humble Oil & Refining Co., Midland; R. J. Leonard, Leonard Oil Co., Roswell; N. G. Penrose, N. G. Penrose, Inc., Fort Worth; Don Wallace, Fullerton Oil Co., Hobbs; and Stanley Carper, Carper Drilling Co., Artesia.



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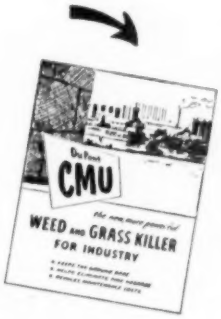

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PETROCHEM REPORT

Vinyl-Type Monomers From Petrochemicals

Plastics, fibers, synthetic rubbers, finishes, soil conditioners are end products

by C. E. Schildknecht*

THE hydrocarbon monomers from petroleum sources have at least double the production of the nonhydrocarbon monomers, largely because of the enormous quantities of styrene and butadiene used for synthetic rubber and plastics. However, the nonhydrocarbon monomers containing oxygen, nitrogen, and halogens have great growth potentials and comprise one of the most active fields of industrial development.

Vinyl chloride, vinyl acetate, chloroprene, and acrylic monomers are the largest, but many others derivable from petrochemicals are pressing forward. Polymers and copolymers from the monomers are used as fibers, plastics, synthetic rubbers, finishes, synthetic gums, soil conditioners, and in an ever-widening variety of uses.

Acetylene source . . . Of current interest is the competition between petrochemical and nonpetrochemical raw materials. Acetylene from cracking or partial oxidation of natural gas will compete with acetylene from calcium carbide. Another recent development is the utilization of acetaldehyde, ketene, acetic anhydride, and other products from partial oxidation of butane and other hydrocarbons from the preparation of monomers. In the future contest between carbide acetylene and petrochemical raw materials an important factor will be the degree of monomer purity which can be attained economically. Acrylonitrile is an example of a monomer in which high purity is necessary for preparing satisfactory polymers.

Vinyl chloride ($CH_2{=}CHCl$) is prepared by pyrolysis of ethylene dichloride derived from ethylene and chlorine. This reaction produces as a byproduct hydrogen chloride which can be reacted with acetylene in the presence of mercuric salt contact catalysts to give more vinyl chloride. This combination of ethylene and acetylene reactions is regarded as most economical for production of vinyl chloride. About 340 million pounds of vinyl chloride polymers (excluding plasticizer) were made in this country in 1952. Vinyl chloride polymers appear in an amazing variety of plastics, elastomers, and fibers. Recent developments include rigid molding plastics, sponge, flooring, film for packaging, and plastogels. Vinyl fluoride polymers are not yet important commercially.

Vinylidene chloride ($CH_2{=}CCl_2$) is the principal monomer used in making the saran of Dow Chemical Co. The monomer can be made by pyrolysis of

*Stevens Institute on Technology. Summary of paper on "Vinyl-Type Nonhydrocarbon Monomers." Presented as part of a petrochemical lecture series, sponsored by the North Jersey section, A.C.S.

CHEMICAL REACTIONS FOR ACETYLENE PRODUCTION

1. Production from calcium carbide:

$$CaC_2 + H_2O \rightarrow CH{\equiv}CH + CaO$$

2. Production by cracking natural gas:

$$CH_4 \xrightarrow[\text{ca-2,500° F.}]{\Delta} CH{\equiv}CH + \text{byproducts}$$

3. Production by partial oxidation of natural gas:

$$CH_4 + O_2 \rightarrow CH{\equiv}CH + H_2O + \text{byproducts}$$

CHEMICAL REACTIONS FOR PRODUCTION OF VINYL-TYPE MONOMERS

1. Production of vinyl chloride:

(a)
$$\left\{\begin{array}{l} CH_2{=}CH_2 + Cl_2 \rightarrow CH_2Cl{-}CH_2Cl \\ CH_2Cl{-}CH_2Cl \xrightarrow{\Delta} CH_2{=}CHCl + HCl \end{array}\right.$$

(b)
$$CH{\equiv}CH + HCl \xrightarrow[\text{Catalyst}]{Hg} CH_2{=}CHCl$$

2. Production of vinylidene chloride:

$$CH_2{=}CH_2 + Cl_2 \longrightarrow CH_2Cl{-}CHCl_2 + HCl$$

$$CH_2Cl{-}CHCl_2 \xrightarrow{\Delta} CH_2{=}CCl_2 + HCl$$

3. Production of chloroprene:

$$2CH{\equiv}CH \xrightarrow[\text{aq. } Cu_2Cl_2]{} \underset{\text{Vinyl acetylene}}{CH_2{=}CH{-}C{\equiv}CH}$$

$$CH_2{=}CH{-}C{\equiv}CH + HCl \rightarrow \underset{\text{Chloroprene}}{CH_2{=}CH{-}CH{=}CHCl}$$

4. Vinyl acetate production:

$$CH{\equiv}CH + CH_3COOH \xrightarrow[\text{on charcoal}]{\text{zinc acetate}} CH_2{=}CHOOCH_3$$

5. Acrylonitrile:

(a)
$$\underset{\text{Ethylene oxide}}{CH_2{-}CH_2\ (O)} + HCN \rightarrow CH_2{=}CHCN + H_2O$$

(b)
$$CH{\equiv}CH + HCN \rightarrow CH_2{=}CHCN$$

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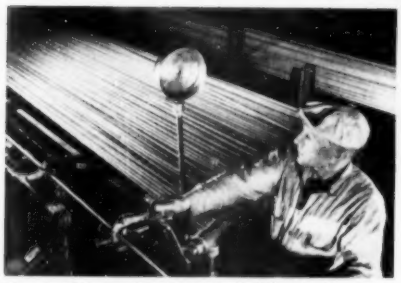

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trichloroethane which can be derived from acetylene or ethylene with chlorine. Saran production has exceeded 20 million pounds, especially for use in filaments, films, and latex. Vinylidene fluoride is derived from acetylene experimentally.

Of the fluorocarbon polymers tetrafluoroethylene is not derived from acetylene or ethylene, but from chloroform and hydrogen fluoride. However, chlorotrifluoroethylene, the monomer for Kel-F and fluorothene plastics, is derived from acetylene. These polymers noted for resistance to solvent attack and to extremes of temperatures are produced in relatively small but growing volume.

Vinyl acetylene . . . Two molecules of acetylene combine in presence of aqueous cuprous chloride to form vinyl acetylene. Hydrogen chloride adds to the latter to form chloroprene, the monomer which is polymerized to give neoprene synthetic rubbers. These oil-resistant rubbers were introduced by du Pont in the early 1930's and reached a production of 132 million pounds in 1951.

Vinyl acetate ($CH_2=CHOOCCH_3$) is prepared by gas phase reaction of acetylene and acetic acid over zinc acetate or other catalysts on charcoal. Production approaches 100 million pounds, the largest outlet being aqueous dispersions of vinyl acetate polymers used as adhesives, textile finishes, and in many other applications. New uses being developed for vinyl acetate copolymers include soil conditions, water paints, modified concrete and flooring compositions. From polyvinyl acetate are also derived polyvinyl alcohol (water soluble) and polyvinyl acetals (safety glass laminates and wire covering). Vinyl esters of higher acids than acetic have received little research attention until recently.

Acrylic esters . . . Acrylic esters ($CH_2=CHCOOR$) have been prepared from ethylene oxide, HCN, and the alcohol. However, recently plants in Germany and in Texas have begun manufacture from carbon monoxide, acetylene, alcohol, and nickel carbonyl. Acrylic esters also can be prepared from beta-propiolactone, a compound derived from ketene and formaldehyde. Methyl acrylate, ethyl acrylate, as well as higher acrylates give useful elastomeric polymers.

Methyl methacrylate, derived from propylene, HCN, and methanol, gives rigid plastics such as lucite and plexiglas. Copolymers of methacrylic esters of higher alcohols, e.g., octyl and dodecyl, are important lubricant additives. Acrylic and methacrylic acid (vinyl acids), prepared by methods analogous to those of the acrylic esters, give water-soluble polymers used as textile sizes, thickening agents, and soil conditioners.

Acrylonitrile . . . One of the monomers most in the headlines in recent months is acrylonitrile or vinyl cyanide $CH_2=CHCN$. The reason is its expected expansion for acrylic fibers, copolymer plastics, rubbers, and perhaps for soil conditioners. In 1952 it is believed that 40 million pounds was made, largely by one manufacturer from ethylene oxide and HCN.

The synthesis of pure acrylonitrile from acetylene and HCN has presented difficulty, but this method utilizing acetylene from gas is being undertaken by Monsanto and American Cyanamid. Other intermediates from which acrylonitrile may be prepared include acetaldehyde and HCN, beta-propiolactone and ammonia, meta-methoxy propionitrile, propionitrile, and acrylamide.

Maleic anhydride derived from oxidation of benzene is growing in use as a comonomer. The copolymer with styrene is stymer (textile warp size) and with vinyl acetate it gives copolymers used as finishes and soil conditioners (krilium). Allyl alcohol derived from propylene is used in making such monomers as allyl diglycol carbonate (CR39), diallyl phthalate as well as allyl starch.

Among small volume and experimental monomers are acrylamide and t-butyl acrylamide supplied by American Cyanamid, n-alkyl acrylamides of Goodrich and methacrylamide of Rohm & Haas. These, like the vinyl pyridines, may be copolymerized with acrylonitrile in order to improve the dye receptivity of acrylic fibers. Phillips Petroleum is producing 2-methyl-5-vinyl pyridine from acetaldehyde and ammonia. Other vinyl pyridines are made by Reilly Tar & Chemical Co. and by Carbide & Carbon Chemical Corp. Vinylidene cyanide can be made from ketene and HCN both, derivable from petroleum. Its copolymers are being evaluated by Goodrich.

Oxygenated materials . . . Vinyl ethers are prepared from acetylene and alcohols, or from the acetals derived from acetaldehyde and alcohols. Alkyl vinyl ethers supplied commercially by General Aniline & Film Corp. and by Carbide & Carbon are used as intermediates for synthesis, as well as for polymers and copolymers. Sulfur vinyl compounds such as vinyl thioethers, vinyl sulfonic acid have not become important commercially. Among the nitrogen-vinyl monomers the best known are vinyl carbazole and vinyl pyrrolidone, both best prepared using acetylene. The polymers have been used as dielectric plastics and as blood-lactone and ammonia, beta-methoxy-plasma extenders, respectively. Pyrrolidine can be prepared from formaldehyde, acetylene, and ammonia.

The vinyl ketones and vinyl aldehydes (acrolein and methacrolein) are used as chemical intermediates but have not found importance in polymers. They can be obtained from products of hydrocarbon partial oxidation.

Petrochemical Detergents*

The essential materials for most types of synthetic detergents, the soapless soaps, are derived from the products of modern refining processes. The largest volume detergent for example, is the alkyl aryl sulfonate type. The chemical requirements include benzene, either the tetramer of propylene or kersone hydrocarbons, and sulfuric acid, all of which are available from petroleum. Benzene is produced by the Platforming or other catalytic reforming processes, propylene from cracking gases and its tetramer from polymerization, kerosene hydrocarbons from the distillation of crude oil, and sulfuric acid from sulfur recovered from refinery or natural gas.

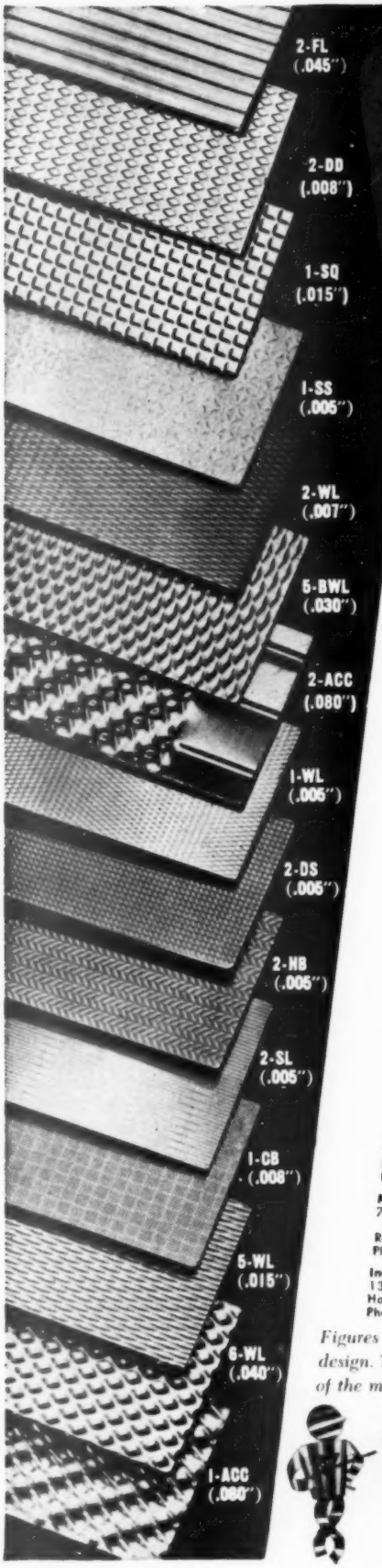
The non-ionic type of detergents, another popular class, is made from petroleum. The phenol used therein was formerly a coal tar derivative but is now made from petroleum-derived benzene or from cumene by a new process which does not require scarce chlorine or sulfuric acid. The quarternary ammonium detergents, an important type because of their germicidal action, are also derived from petrochemicals. The raw material requirements are heavy aromatic hydrocarbons from petroleum and methane and ammonia from natural gas.

The future market in these detergents is almost unlimited. The present yearly production of slightly under 2 billion pounds is below present demand. They have already replaced about half of the soap market because of their superiority and specificity for certain purposes.

*From an address by Dr. Gustav Egloff, Universal Oil Products Co.

Answer to "Check Chart"

The puzzle picture installation on page 96 is correctly identified as being a moisture trap on gas accumulator of a "package type" gas booster for injecting gas to flowing well, Magnolia Petroleum Co.'s John Snowden lease, Tex Harvey field (Spraberry), Midland County, Texas.



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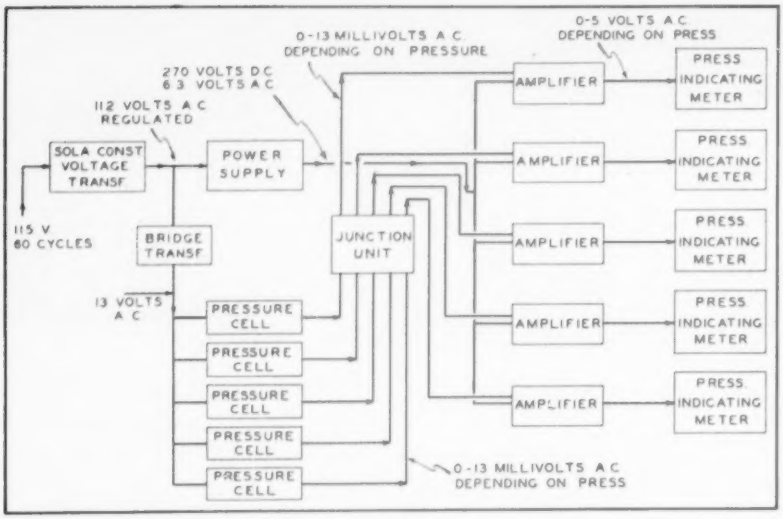


Fig. 1—Block diagram for SR-4 pressure measuring system.

Electrical Pressure Gages Give Plantation Trouble-Free Service

Training program has produced personnel qualified in maintenance of new pressure-measuring system

by William W. Holt, Jr.*

FOLLOWING experience with an experimental installation of electrical gage instrumentation employing the Baldwin SR-4 strain-gage pressure cells, Plantation Pipe Line Co. decided to incorporate a redesigned system in its recent expansion program.

The main difference between the new system and the experimental is that it is a.c. instead of d.c. operation and that an individual amplifier increases the power output of each pressure cell to its corresponding meter. All vacuum tubes in the power supply are eliminated. The amplifier in each pressure channel permits the use of a more rugged meter with better readability, quick response, and one that can be mounted in a horizontal position.

Fig. 1 shows a block diagram of the SR-4 pressure measuring system. The 115-volt, 60-cycle a.c. power is supplied at the left to the primary of a Sola constant-voltage transformer. A regulated 112 a.c. voltage is then applied to the main power supply. It is of drawer-type, plug-in construction and contains no vacuum tubes. The component parts are a transformer, selenium rectifiers, and filter circuit which supplies d.c. plate voltage for the tubes in the amplifiers. Filament voltage is also supplied by this unit. A bridge transformer with an output of 13 volts a.c. supplies the pressure cells.

The output of the cells then passes through the junction unit and to the amplifiers. These are of the two-stage type using a 5691 Red Line tube which has an expected filament life of 10,000 hours. The amplifiers employ high degenerative feedback for stability and therefore limit signal amplification to the 5 volts necessary to drive the indicating meter to full scale.

The indicating meters are dial type having approximately 270° needle swing. They are standard Westinghouse 5-volt a.c. rectifier-type voltmeters and are connected directly to the output of the amplifiers.

The console is installed in a standard switchgear cabinet. The amplifiers, storage compartment, power supply, junction unit, and the blower are in that order, from top to bottom. All parts are removable for service or replacement from the front. A spare amplifier is included in the amplifier section at the top and can be used with cells of any pressure range.

Routine Maintenance

Until sufficient experience has been obtained to warrant a change, Plantation's electrical crews will perform a complete dead-weight calibration of all pressure channels annually. This procedure requires three men working approximately ½ day to complete one station. An electrical calibration is normally performed by station personnel once each week and requires but a few minutes.

Problems Encountered

In assembly many of the SR-4 cells were damaged by rough and careless handling. Finally a 1-in.-diameter pipe nipple, cut to the same length as the cell, was used in making up all piping and conduit fittings, and the cell was installed later.

Plantation used 1-in.-diameter pipe fittings on all liquid lines to the pressure cells. This size was not only difficult to make up because of the short nipples but required excessive pumping with the dead-weight tester in order to build up test pressures. One-inch fittings from the main line through the valve and then ½-in. fittings to the pressure cell would reduce the time necessary for calibration and put less strain on the cells.

Two cell failures were traced directly to mechanical vibration. This was corrected by a change in nipple length and a resulting change in the natural frequency of the cell assembly. No further failures of this nature have been reported.

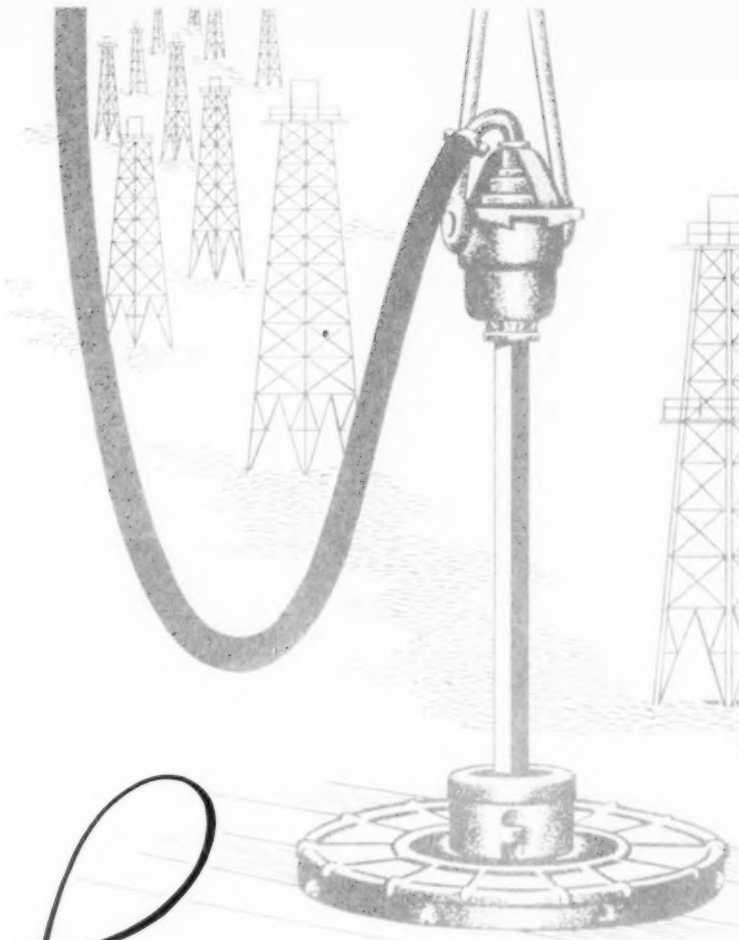
The pressure cells should be mounted vertically with the liquid end pointing down. There have been several cases when dirt has caked into the liquid chamber and caused the cell to malfunction. Also water collects in this area and freezing renders the cell inoperative.

Conduit settling has damaged several cells. A more substantial underground foundation readily eliminated this situation.

The valves off the main line should provide a tight seal between the line and the pressure cell; otherwise a steady test pressure cannot be maintained. This will seriously affect the accuracy of the system. Because of the dirty condition of a new pipe line, some trouble has been experienced with these valves.

The blowers, mounted under the amplifiers for cooling purposes, direct dust up into the junction unit and the

*Plantation Pipe Line Co., Atlanta. From paper presented at A.P.I. Division of Transportation meeting, Kansas City, April 1953.



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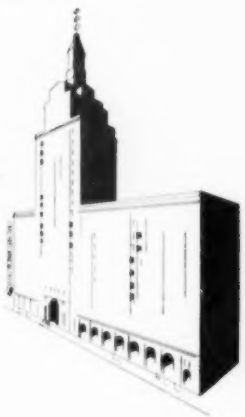

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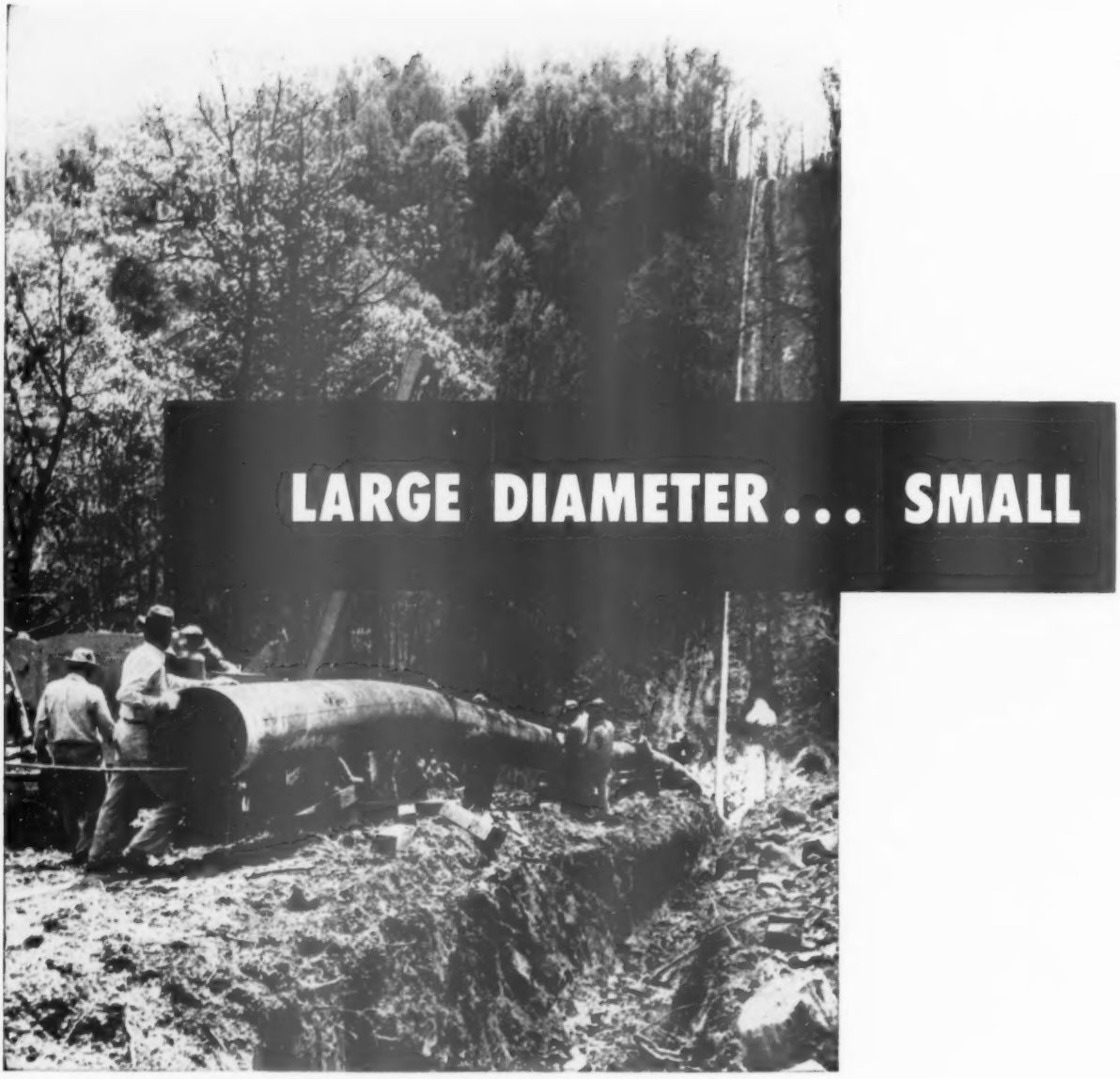

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amplifiers. Probably a dust stop on the intake would solve this problem. There has not been any difficult from this condition.

Some meters, whose gaskets had been damaged, would stick because of accumulated dust. Proper cleaning and sealing returned them to good working order. No meter failures have been experienced.

After putting the system into operation, the most serious problem was encountered with operators. Their natural curiosity about new equipment and resultant tinkering required the recalibration of many channels.

One Year's Experience

The pressure cells, when subjected to normal operating service, are trouble-free. Physical damage is readily and economically repaired. None have been damaged so completely as to require replacement. Many cells are subjected to pressures of 150 per cent of their normal rating without any apparent damage.

During the first year's operation, there has not been a single failure among the 164 amplifiers and tubes used on the entire pipe line. This fact is impressive even though the expected vacuum tube life was 10,000 hours.

The constant-voltage transformers and selenium rectifiers have been completely trouble-free.

An excellent training program, initiated during construction for the electrical crews, has produced personnel well qualified in the maintenance of the pressure-measuring system. The instruction of station operators in the principles and care of the system has eliminated call-outs of the electricians, and repairs are made during their normal preventive maintenance visits.

Over-all this electrical instrumentation has established itself as a very stable, accurate, and trouble-free method of transmitting remote pressure readings to a central control point. It is well liked by operating personnel who repeatedly point out the lack of minor needle fluctuations and the excellent readability of the meters.

Have You Tried Hydraulic Fracturing

(Continued from page 80)

clean up the well following the fracturing job. The rate at which the fracturing oil can be cleaned from the formation is inversely proportional to the viscosity; the lower the viscosity of the fracturing fluid, the more rapid rate at which it can be recovered from the formation.

For multiple fractures—"One fracture for every 20 to 40 ft. of formation, depending on permeability, is optimum."

One consideration which might indicate the desirability of a high-viscosity fracturing fluid is the necessity of viscosity for transporting the sand usually used in fracturing fluids to the fractured interval, and into the formation without allowing an excessive quantity of sand to fall out into the bottom of the well and thus foul pumps and equipment later during the producing of the well. There are, however, cases on record of the use of very low-viscosity fracturing fluids with little sand difficulties after the completion of the job. In one case water was used to fracture a water-injection well with no apparent sand difficulties after completion of this operation.

Considering a tendency of fracturing oils to emulsify with water, it has been found that some oils contain polar or other compounds which cause the formation of severe emulsions when the fracturing oil contacts the formation water, either in the well or in the formation. The consistencies of these emulsions frequently are equivalent to that of axle grease, and in one case a 16-bbl. per day well was completely plugged and production never recovered. It is, therefore, very desirable when using a new or unknown fracturing oil to test its tendencies to emulsify with water prior to using it in a well. This can be accomplished by mixing a 50-50 volume of fracturing oil and water together in a container and stirring with a stick or other stirring device. In most cases a slight emulsion will occur, increasing the viscosity of the oil approximately 50 per cent. However, this has been found not be a serious condition. If, however, the mixture of the water and the oil produces an emulsion of very thick characteristics, then this oil should not be used as a fracturing fluid. To date, all of the oils which have indicated emulsifying tendencies will produce a thick emulsion with any type of water. However, it is preferable when testing emulsifying properties to use the formation water from the well to be fractured, because it may be possible that some formation waters will contain compounds which will produce an emulsion.

Multiple Fractures

Past experience has indicated that one fracture for every 20 to 40 ft. of formation, depending upon the permeability, is optimum. Therefore, when fracturing formations of thicknesses from 20 to 40 ft., the formation of only one fracture is all that is usually necessary. When fracturing formations greater than 40 ft. in thickness, however, two or more fractures (depending upon the multiples of 20 to 40 ft.) should be made in order to obtain optimum results.

Multiple fractures can be obtained by the use of straddle-type packers or by the use of lost-circulation materials which can be used to plug old fractures in order to build up sufficient pressure to create new fractures.[3] The use of straddle packers for creating multiple fractures is obviously preferable because the location of the fractures can be selected, whereas the use of lost-circulation materials could conceivably create a number of fractures close together in one zone and leave the remainder of the formation unfractured. This type of fracturing would be little or no better than a single fracture.

When hydraulic fracturing through perforations in casing using thick oils containing sand, the behavior of the pressure during the fracturing job frequently indicates that a series of fractures is formed rather than just one fracture. This is suggested by successive increases and decreases in the pressure during the job without a change in the pump rate. In view of this behavior of pressure, a study was made of the production increases obtained when fracturing perforated intervals vs. open-hole sections. A review of the results obtained when fracturing 23 wells in the north Texas area revealed an average increase of 434 per cent for wells treated through perforations and 167 per cent for wells treated in open-hole sections. These averages were obtained from treatments of wells on which the production data prior to fracturing were available.

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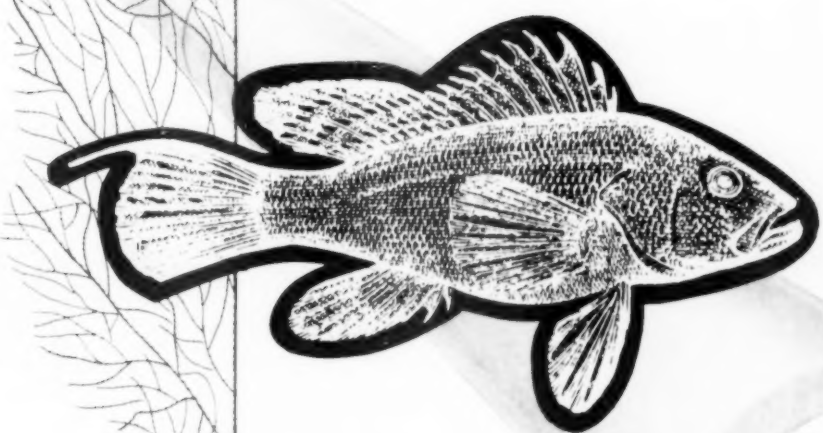

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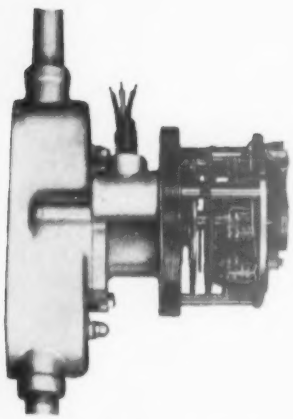

The VARIOPLEX SYSTEM, operating in conjunction with automatic tank gages now installed, transmits measurements by electrical impulses—8 per second—and is applicable to the short distances of tank farm to control room, using the company's own transmission lines, or CROSS COUNTRY gaging over leased wires. The same impulses can be transmitted by microwave or by radio—if these media are presently available. Although born to the petroleum industry, it is equally applicable to the gaging of liquid levels in the chemical industry, paint and varnish, vegetable oils, food processing, distilling, etc. It will also be of interest to public utilities and government agencies concerned with measuring the rise and fall of water levels in lakes, reservoirs, rivers, canals and dams.

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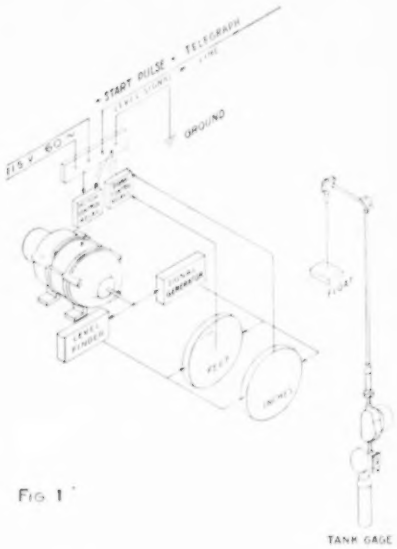
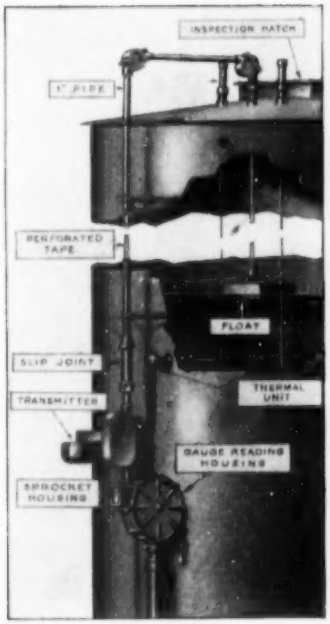


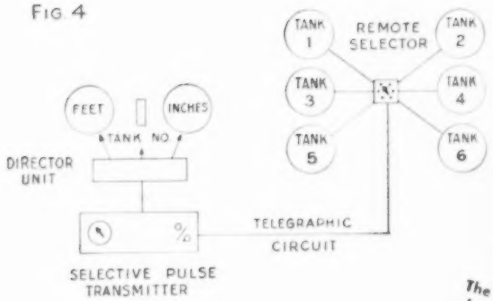
FIG 1

VARIOPLEX is the essence of simplicity. You may have your readings simultaneous or sequential. In electrical circuits, you may have as little as one wire and ground, or more as desired. You may transmit by wire, mirco-wave or radio. The system employs the start/stop, step by step method of telegraphic transmission. The system has great potential for expansion into the fields of supervision and control.



The drawing shows the arrangement of an S. & J. Automatic Tank Gage with VARIOPLEX sprocket housing and transmitter. If you have S. & J. or any other make of Automatic Tank Gages employing perforated metal tapes, you can use the VARIOPLEX with existent installations.

FIG 4



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BOOKS

THE SCIENCE OF PETROLEUM—SYNTHETIC PRODUCTS AND REFINERY PROCESSES. General editors Benjamin T. Brooks and A. E. Dunstan. Published by Oxford University Press, 114 Fifth Avenue, New York 11. 329 pp. $35.

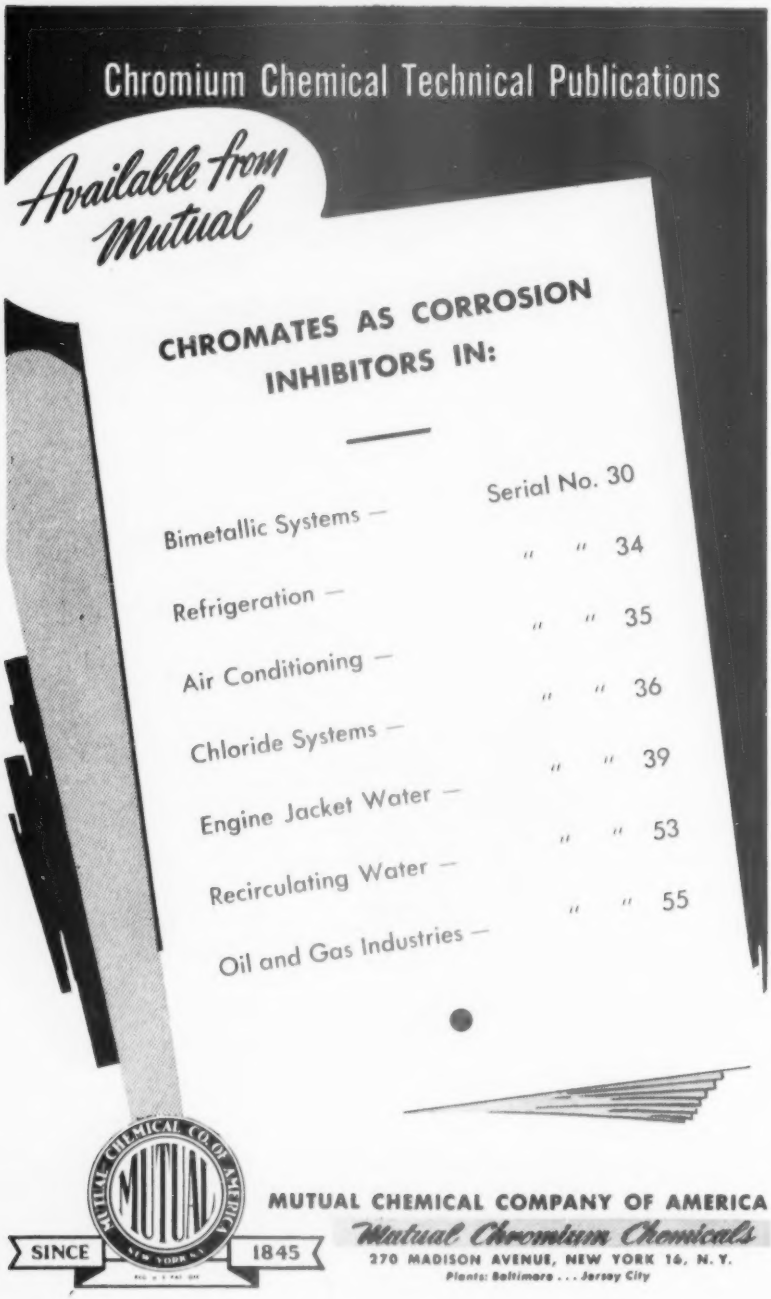
This volume is published as Volume 5, Part 2, of The Science of Petroleum. It covers the synthetic products of petroleum, including raw materials for rubber solvents, and considers in detail intermediate refinery processes. The latter section is divided into distillation, refinery processes, cracking, hydrogenation, dehydrogenation, dewaxing, and alkylation. In all there are 28 separate papers written by 54 experts, American and British, covering the latest advanves in the technology of petroleum. Each section is fully illustrated and has a comprehensive bibliography.

GEOLOGY OF AGUA FRIA QUADRANGLE, BREWSTER COUNTY, TEXAS. By C. Gardley Moon. Published by University of Texas Bureau of Economic Geology, Austin. 195 pp. 50 cents.

This paper continues the publication of data on Trans-Pecos Texas geology and is a part of the bureau's project on that area. A geologic map in color on a scale of 1:62,500 accompanies the paper, and several structure sections of the quadrangle are also included.

WHY TAKE AN OPINION POLL? By A. J. Alstrom. Published by Research Division, California Personnel Management Association, 2180 Milvia Street, Berkeley, Calif. $1.

This is a stenographic brief of an address given before the group that published the paper. The author is with Standard Oil Co. of California, and his address gives the reasons behind his company's decision to conduct an opinion poll, points out the problems encountered and how they were solved, and explains the concrete results which have been obtaind to date.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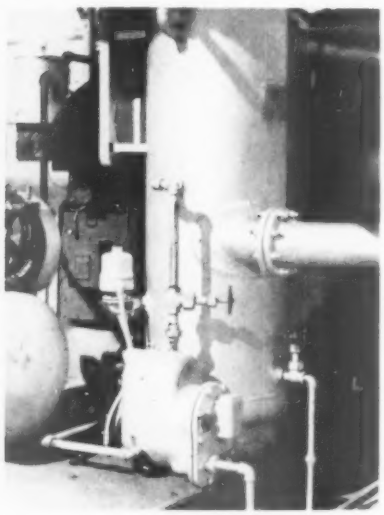
READING FOR PROFIT — JOURNAL CHECK CHART

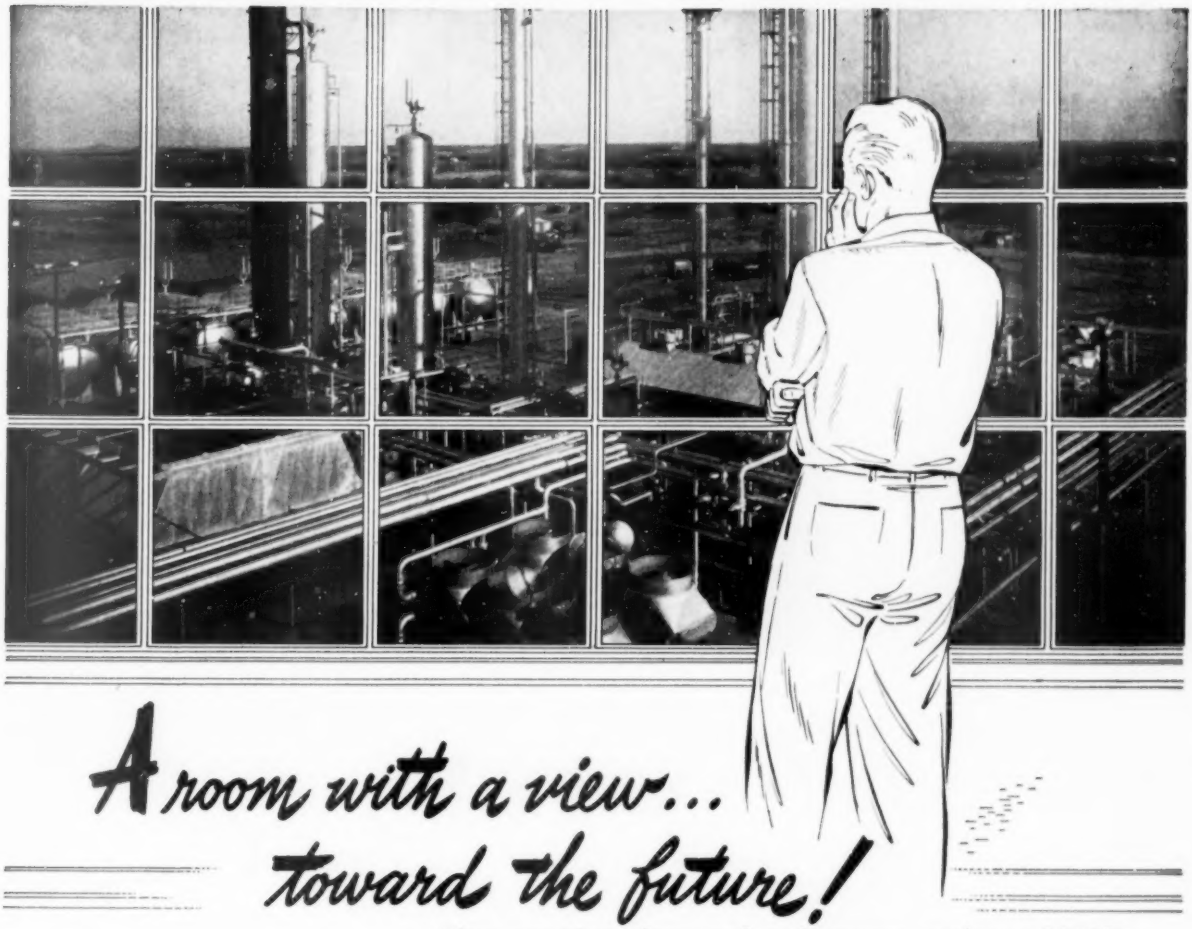
What is This Equipment?

THE Oil and Gas Journal's roving field photographer, R. B. Ward, recently found this interesting equipment in front of his 4 by 5 Speed Graphic. Result is that the installation forms this week's equipment puzzle picture.

What is it? You name it. Put your answer in square opposite the correct statement given below. Turn to page 86 of this issue for correct identification.



- ☐ Steam trap in a waste-condensate accumulator, lube-oil section, refinery in Pennsylvania Grade crude-oil area.
- ☐ Solenoid-actuated float control in lube-oil surge tank (diesel-electric power plant, Gulf Coast natural-gasolin plant).
- ☐ Experimental trash unloader on gas-scrubber main-line compression station, big-inch natural-gas trunk line.
- ☐ Moisture trap on gas accumulator serving compressor, natural-gas service.
- ☐ Water dump valve on equipment making up natural-gas dehydration unit.



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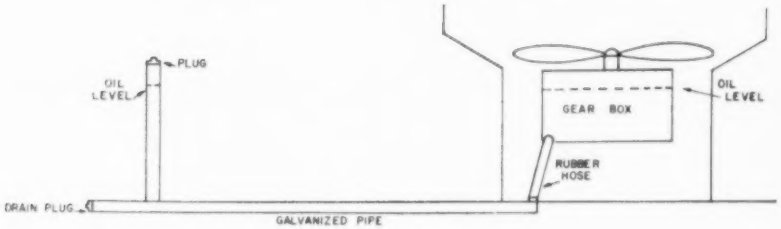
Lubricating Cooling-Tower Fans



AN external method of lubricating gears for cooling-tower fans can be easily installed to eliminate the need of shutting down the fan in order to provide lube service.

The installation calls for a length of galvanized pipe which will run from the location of the gear box to the outside of the cooling tower. At the fan end, this pipe—either 1 or ¾ in.—is connected to the bottom of the gear box by means of a flexible hose, which is unaffected by vibrations.

The other end of the galvanized pipe is plugged; the plug may be removed for draining the gear box. Approximately 1 ft. from the end of the pipe a riser is connected which is high enough to come slightly above the level of oil in the gear box.

Access plug . . . The riser is also provided with an access plug, which may be removed for checking the oil level in the gear box or for replenishing the oil supply.

The "remote" inspection line eliminates the need for shutting down the fan with the attendant necessity of erecting scaffolding each time the gear box requires lube service.

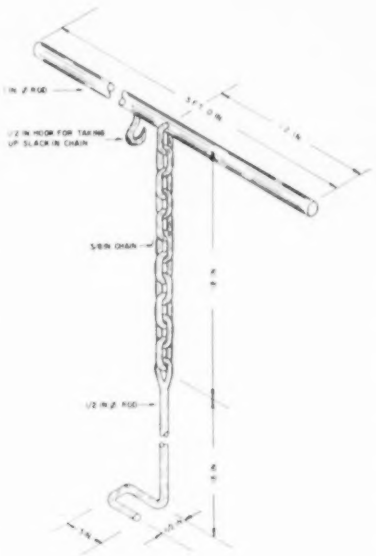
The method was suggested by Calvin Knepple, of Humble Oil & Refining Co., Baytown, Tex.

Tool for Lifting Tank-Car Valves

A SAFE, remote method of lifting tank-car-dome valves may be followed with the use of a simple tool.

The tool consists simply of a 1-in. rod with a short length of chain welded to its center. At the end of the chain is attached a short ½-in. rod which is bent into the shape of a horizontal "U" at its lower end. A hook welded to the 1-in. rod, is used for taking up slack in the chain.

In lifting or replacing tank-car-outlet valves, the loader merely lowers the U into position on the valve, takes up



any slack in the chain by linking it over the hook, and then by applying the necessary twisting and lifting motion removes or replaces the valve. The task when accomplished in this manner requires 5 minutes as opposed to 30-90 minutes by previous methods.

Advantages . . . The savings in time is only one of several advantages in using the tool, such as:

1. Safety. When a man had to be lowered into the car to remove valve, it required steaming of the car to remove residual gases and a pocket remaining even after steaming was possible.

2. Save steam. Since it is no longer necessary for a man to enter the car, steaming merely to remove gases is not necessary.

3. Fast turnaround of cars. It is now possible to remove and replace the valve in short order so that cars may be unloaded quickly and then reused without undue delay.

The method is used by Sinclair Refining Co., Houston.

Tool Carts Found Useful

A number of tool carts, similar to the one above, have been proven useful to maintenance crews at the Robinson, Ill., refinery of Ohio Oil Co. A total of 15 such units, designed and built by the maintenance department under the direction of J. L. Hoelscher, are now in use throughout the refinery.

The cart is fabricated of 3/16 in. and ¼ in. steel plate. It measures 30 in. in height, is 30 in. wide and 48 in. long. It is towed to location by the crew's pickup truck and can easily be positioned by hand. Each cart is divided into two compartments, easily accessible through two hinged doors, which can be locked.

The bottom compartments are large enough for tool boxes and the two trays on each side hold hand tools of all types, small fittings, gloves, goggles, torches, etc. On the inside of each door is a divided blue-print pocket, also useful for protecting time sheets, check lists and other papers. At each end of the cart are positioning legs which are adjusted to keep the cart level and stable.

On the front end of the cart are pipe bending blocks for 1 in., ¾ in., and ½ in. pipe (left) and a vise is mounted at the trailing end of the unit.

Temperature Control of Catalytic Unit Feed

A temperature differential is being used to control flow of feed stock to a fluid catalytic cracking unit.

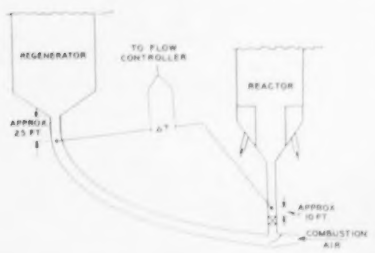
The installation controls the quality of the feed to the unit and thereby controls the amount of carbon being laid down in the reactor. The amount of carbon being laid down, in turn, affects the temperature differential which governs the feed.

The control system required the in-

stallation of two thermocouples, one in the reactor spent-catalyst standpipe above the slide valves, and the other in the spent-catalyst carrier line, approximately 25 ft. below the regenerator. Temperatures at these points are transmitted to a differential temperature-recorder controller, which resets the index of a flow recorder controlling input of preferential feed.

The excessive amount of carbon laid down upon the catalyst in the reactor will cause higher temperatures to be recorded in the regenerator feed line as burning of the carbon proceeds. When the temperature differential becomes too great, the flow controller admits a diluent into the feed line of the fluid unit. The resulting lighter mixture cracks under conditions which provide for a minimum amount of carbon to be laid down upon the catalyst.

The smaller amount of carbon deposited slows the burning rate, lowering



the temperature differential and restoring the catalyst feed to its normal feed stock until such time as carbon deposition builds up to the point where the flow controller is once again actuated by the temperature differential.

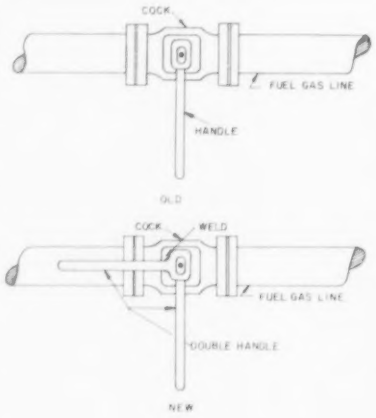
Of the three fluid units in operation (see sketch), the "A" unit is the only one requiring such a system since the feed quality is less constant than at the other two units.

The method is used by Cities Service Refining Corp., Lake Charles, La.

Special Handles for Operating Plug Cocks

The operation of plug cocks can be facilitated by the addition of extra handles on the valve wrench.

On a fuel gas line to a boiler house, the plug cocks were so installed that the original handle would lie in a horizontal direction when closed and in a vertical, downward direction when open. When opening the cocks, the task was simplified since the operator could use his weight to force the handle downward. However, great effort was sometimes required in pulling the handle upward to the closed position.



On each wrench, which resembles a box-end wrench, an additional handle was welded to form a 90° angle with the existing handle. With this arrangement, one of the handles is always in a horizontal position and the cock may be opened or closed by pushing down on one of the handles.

The method was suggested by Monroe N. Fleniken, operator for Esso Standard Oil Co., Baton Rouge, La.

Handy Lift Cart

This handy lift cart is utilized in gas-booster-station construction by El Paso Natural Gas Co. It has a winch with a wire line for lifting. This particular cart is used at the company's Gallup, N. M., station.

Control Room on West Texas Gulf Line

This view is from the control room looking into the pump room of the big Wortham, Tex., junction station on the 26-in. diameter trunk line of West Texas Gulf Pipe Line Co., which is equipped with 10 main-line electric centrifugal-pump units with a total of 9,550 hp. Pump units for each of the three lines radiating from Wortham, Tex., is served by a control console and instrument board. From left to right these are for the lines to Longview, Lucas, and Corsicana, Tex., respectively. Units are started and stopped by push buttons on the consoles which have diagrams indicating motors, pumps, and piping.

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In this self-sufficient plant the "Operators" are built into the plant — a human operator is required only for loading products and routine maintenance. During the night unusual changes in pressures or levels cause the warning ringing of the bedside telephone of the resident operator.

The plant, operating in the Ropes Field of Hockley County, West Texas, is designed to compress and dehydrate 4 million cubic feet of gas per day, extract 67% of the propane, and produce three liquid products totaling 35,000 gallons per day.

The special features to reduce operating costs and minimize capital investment without sacrifice of propane recovery, safety or continuity of operation were developed by HUDSON in collaboration with the engineers of Honolulu Oil Corporation to solve the problem of economically processing small quantities of rich gas.

General view of plant showing HUDSON Combin-aire unit at left.

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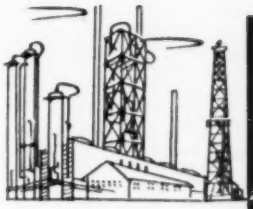
by
Robert L. Jacks*



PUMP SELECTION—1

The Pump for the Job

IN this new series on pumps, starting with this installment, general design procedure for specification of pumping equipment will be given. A brief outline of types of pumps most often employed and the factors which influence their choice will be included. A recommended process specification form will be presented. Discussion will include (1) quality of fluid, (2) capacity, (3) suction and discharge pressures, (4) N.P.S.H., (5) design maximum temperature and pressure, and (6) type of pump and driver. Sample calculations will illustrate the two main problems with which the process designer is most often confronted, namely (a) the design of a new installation and (b) the fitting of available existing equipment to new services.

1. General Design Factors

There are three types of pumps which are usually employed in general chemical service. These types are (1) centrifugal, (2) reciprocating, and (3) rotary. Certain subclassifications of these main types are sometimes specified in special cases, i.e., "vertical well" pumps are a form of centrifugal pump used when very low suction head is encountered and "proportioning" pumps are a form of reciprocating pump used for accurate quantitative injection.

Generally speaking, when choosing the type of pump to be employed, the centrifugal pump is to be preferred for high-capacity, low-head services, whereas the reciprocating type is most desirable for low-capacity, high-head applications. Quantitatively, this is shown in Fig. 1. Where the capacity-head relationship falls within the borderline area, the choice is decided by economic and operating considerations. Of course, other factors influence the choice as well as capacity and head,[1] a few of these being the fluid viscosity, quantity of undissolved gas, and abrasiveness caused by solids present.

A brief description of the more widely used pump types is presented here. A more complete treatment of the subject is given by Church.[2]

A. Centrifugal or Radial-Type Pumps

There are several standard types of centrifugal pumps used in the petroleum and chemical industry. The general-purpose type is the single-stage, single-suction volute type which is good for flows up to 1,500 g.p.m. and pressure heads as high as 600 ft. It can readily be used even for volatile or toxic fluids and hot oils. With large capacities and medium head requirements, such as those in the range of 2,000-50,000 g.p.m. at 200 ft. head, the single-stage, double-suction volute type is more widely employed. A third pump often used is the multistage volute type which is available in capacities up to 4,000 g.p.m. with sufficient stages to develop almost any desired head.

B. Reciprocating or Positive-Displacement Pump

Two types of reciprocating pumps comprise the majority of positive displacement units in general use. These are the simplex type, consisting of a single steam cylinder and a single process or fluid cylinder, and the duplex type, consisting of two steam and two process cylinders operating together. Nearly all of these are double-acting (two pumping strokes per cylinder per cycle), an exception being the case of high-pressure service where single-acting units are used. The duplex pump is a rugged and simple machine, has a smoother flow than the simplex, and is very dependable in operation. The cost of a duplex pump, per unit of capacity, is less than for the simplex type.

*Esso Standard Oil Co., Louisiana Division, Baton Rouge.
Excerpt from paper in Chemical Engineering Progress, May 1953, page 235.

References

1. Taylor, Irving, Chem. Eng. Progress, 44, 336-338 (1948).
2. Church, A. H., "Centrifugal Pumps and Blowers," N. Y., Wiley & Sons, Inc., 1944.

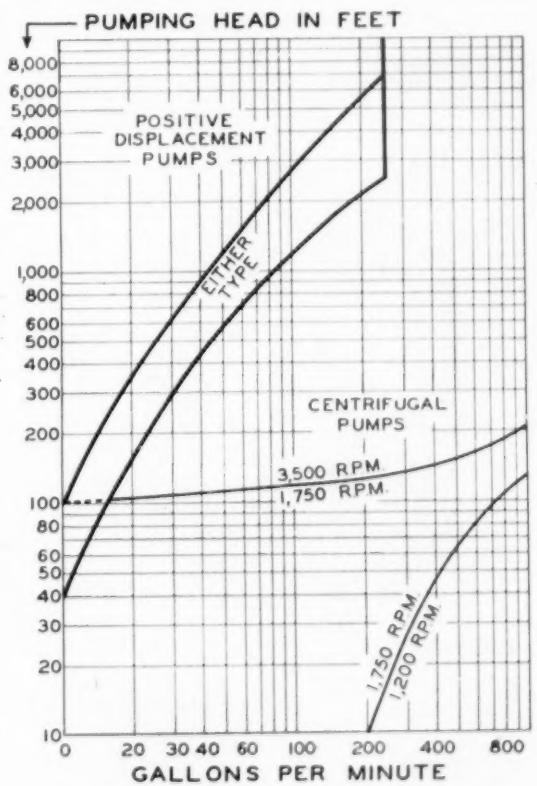


Fig. 1—Pump-selection chart

ALL FORGED STEEL

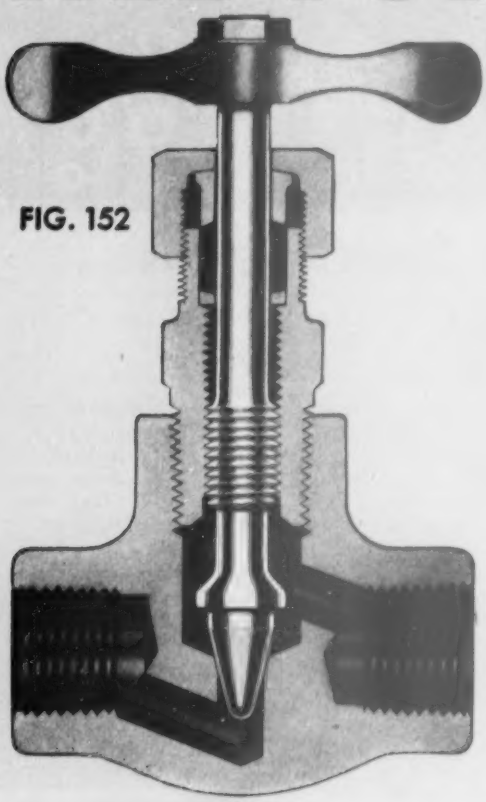


FIG. 152

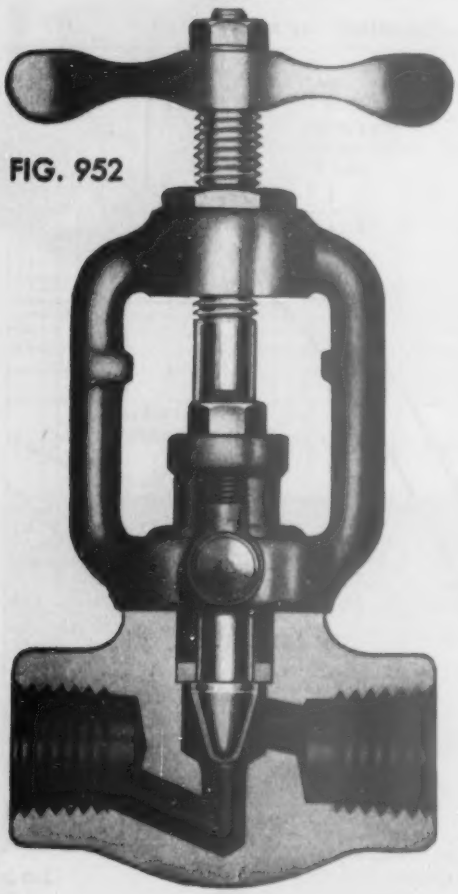


FIG. 952

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FIG. 152 GAGE VALVES For services where excessively high temperature or pressure requirements do not exist, these moderately priced Fig. 152 valves provide an economical, dependable answer. Rated for 4000 psi at 150F or 600 psi at 750F. Furnished in globe or angle styles in sizes from ⅛ in. to 1 in. Construction features include:

- tight tapered body-bonnet joint
- semi needle stem-disk for fine regulation
- bonnet and packing nut plated to reduce galling and corrosion
- wide seat joint for tight seating
- furnished in three different body materials—carbon steel; all parts 13% chromium steel; or all parts 18-8 stainless steel

FIG. 952 INSTRUMENT VALVES Rated for 6000 lbs WOG at 100F or for 1500 psi sp at 850F, these extra strength forged steel valves give dependable protection and precise regulation for instrument, meter, and gage services involving excessive temperatures or pressures. Also furnished in 13% chromium stainless steel with higher ratings for corrosive services. Available in globe and angle styles in sizes from ¼ in. to 1 in. with screwed or socket welding ends. Construction features include:

- EValloy 13% chromium stainless steel stem-disk with needle point for close flow control
- forged steel EValized gland bolts that swing out of the way for easy repacking
- no bonnet joint to leak
- forged steel corrosion-resistant EValized packing gland
- special heat resistant die molded EValpak packing

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Another Product

Determination of Oil Carryover in Steam Distillation

by D. K. Knight* and D. Rowe†

IF steam condenses in the tower during vacuum fractionation, thereby forming two liquid layers, the ratio by weight of oil to steam in the vapor is:

$$\frac{W_o}{W_s} = \frac{p_o M_o}{p_s M_s} \qquad (1)$$

where: W_o = weight of oil, W_s = weight of steam, p_o = partial pressure of oil, p_s = partial pressure of steam, M_o = molecular weight of oil, M_s = molecular weight of steam.

In the usual refinery case where tower conditions are such that the steam does not condense on the plates, both temperature and pressure can be independently fixed. Equation 1 becomes:

$$\frac{W_o}{W_s} = \frac{p_o M_o}{(P - p_o) M_s} \qquad (2)$$

*University of Tulsa, and †Atlantic Refining Co.

where P is the total or tower operating pressure.

The basis of the accompanying chart is 1,000 lb. of steam. Hence, W_s = 1,000 and M_s = 18. Equation 2 now becomes:

$$W_o = \frac{1{,}000\, p_o M_o}{(P - p_o)\, 18} \qquad (3)$$

where W_o is the pounds of oil carried overhead per 1,000 lb. of steam.

Use of the chart is illustrated by the following examples:

Example 1 . . . A vacuum tower is operating at 400 mm. of Hg pressure and the top temperature is 231° F. the overhead product has a normal molal average boiling point of 600° F., a molecular weight of 255, characterization factor, K, of 11.8, and exerts a partial pressure of 0.340 mm. of Hg at the operating temperature of 231° F. Calculation by the above Equation 3 shows:

$$W_o = \frac{1{,}000\ (0.340)\ (255)}{(400 - 0.340)\ (18)} = 12.05 \text{ lb.}$$

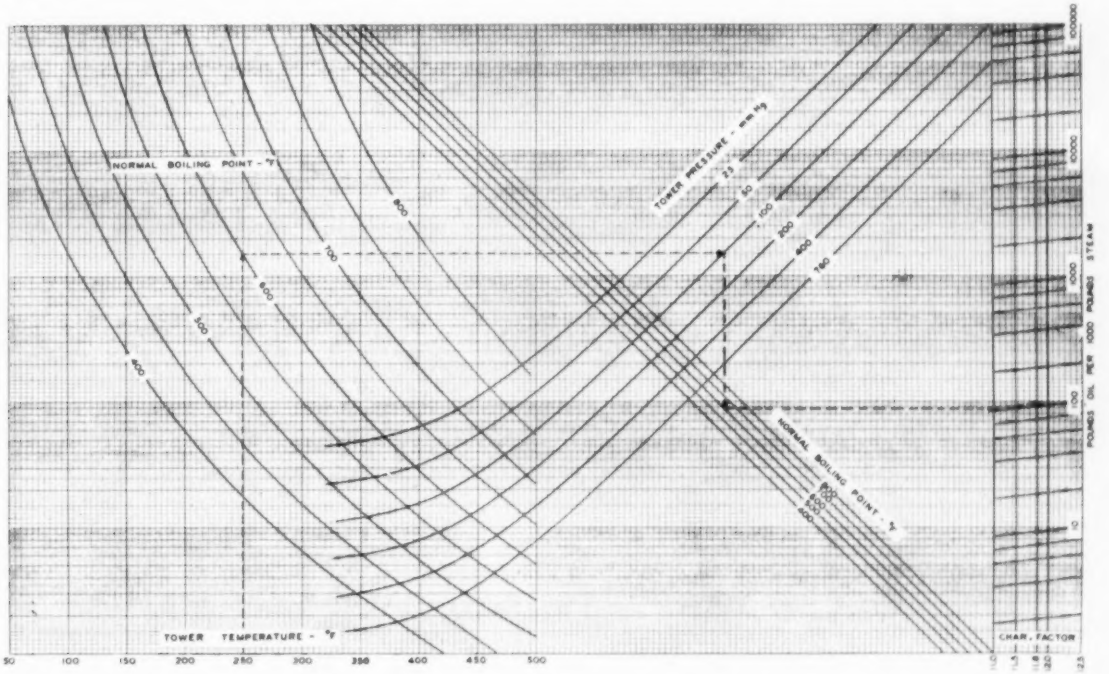
while a value of 11.9 lb. of oil per 1,000 lb. of steam is obtained graphically.

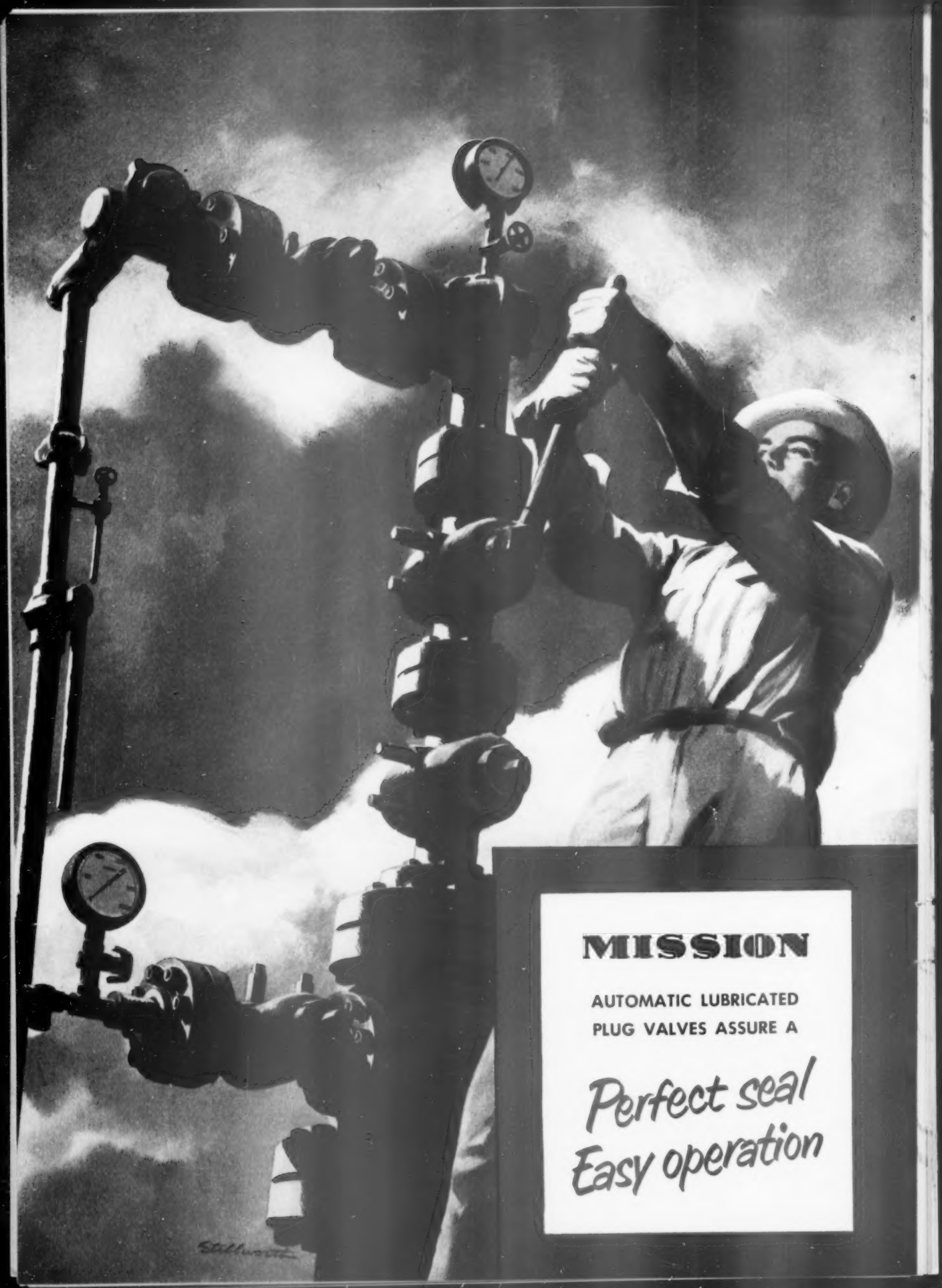
Example 2 . . . A vacuum distillation tower operates at 24 mm. Hg and a top temperature of 150° F. The overhead product has the following properties: characterization factor of 12.0, molecular weight of 255, boiling point of 530° F., and a partial pressure of 0.09 mm. of Hg.

A value of 48.1 lb. of oil per 1,000 lb. of steam is obtained by calculation while the graph indicates a value of 48.0.

Example 3 . . . A Pennsylvania topped crude is being subjected to steam distillation in an atmospheric tower. The overhead gas oil has the following properties: gravity, 37.4° A.P.I.; molal average boiling point, 522° F.; characterization factor, 12.0; molecular weight, 237; and partial pressure at tower conditions, 9.2 mm. Hg.

The temperature at the top of the tower is 300° F. The value of W_o as read from the chart is 160 lb. of oil per 1,000 lb. of steam as compared to 161.2 lb. calculated from Equation 3.


NORMAL BOILING POINT - °F
TOWER PRESSURE - mm Hg
TOWER TEMPERATURE - °F
POUNDS OIL PER 1000 POUNDS STEAM
CHAR. FACTOR
PART
NORMAL BOILING POINT - °F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Easy operation

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Line pressure automatically forces lubricant from lubricant reservoirs to sealing grooves. Both ports are encircled by full-port lubricant grooves. Dual lubricant guns, which use stick lubricant, permit simplified selective lubrication. When lubricating a Mission Plug Valve, a portion of the lubricant is forced into the reservoirs. Line pressure automatically feeds this stored lubricant, as needed into the downstream seal grooves. As long as lubricant remains in the reservoirs, a perfect seal is assured in high or low pressure . . . gas or liquid . . . regardless of which end of the valve may be downstream, thus assuring a perfect seal, easy operation.

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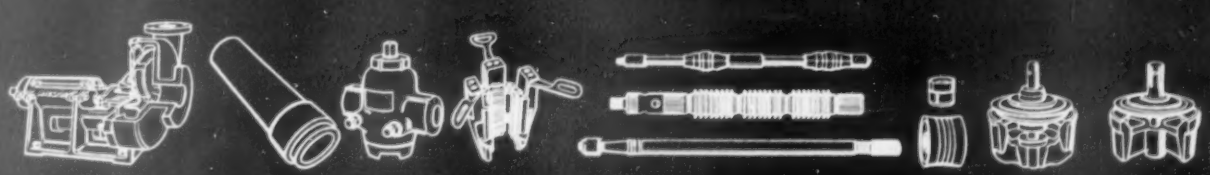


QUESTIONS ON TECHNOLOGY

by W. L. Nelson
Technical Editor

Trading One Gasoline for Another

"We have been called upon to trade 1,000 bbl. of premium gasoline selling at $4.78 per barrel for an equivalent number of barrels of regular gasoline selling at $4.36 per barrel. The compositions of the gasoline are:

	Regular	Premium
Catalytic gasoline (5.04/bbl.), per cent	25	50
Natural gasoline (3.50/bbl.), per cent	20	20
Straightrun gasoline, per cent	55	30
TEL, cents per barrel	18	24

"How many barrels of the regular gasoline should we receive for 1,000 bbl. of the premium gasoline?"—R.E.G.

It is obvious that if 1,096 bbl. of regular gasoline is traded for 1,000 bbl. of premium gasoline that the deal will be without profit to either party:

$$1{,}000 \times 4.78 = 1{,}096 \times 4.36$$

$$= \$4{,}780$$

Thus, if less than 1,096 bbl. of regular can be traded for 1,000 bbl. of premium, it will be profitable to the owner of the regular gasoline and vice versa.

However, the two market prices for gasolines are not consistent because the owner of premium gasoline receives a price of $4.40 for his straightrun gasoline, whereas the owner of regular gasoline receives only $4.04 for his straightrun gasoline. Thus, from the standpoint of the owner of the premium gasoline he feels that he should receive 1,093 bbl. of regular gasoline, whereas the owner of regular gasoline might rightly feel that he could trade only 1,049 bbl. for 1,000 bbl. of premium gasoline if he values his straightrun gasoline at $4.40. He might so feel if he had facilities whereby he could upgrade his regular gasoline into the premium grade. The price structure indicates that regular gasoline is at the moment more readily available than premium gasoline.

Thus, at a natural-gasoline price of $3.50 per barrel, the breakeven amounts that should be traded are related to the value placed upon straightrun gasoline by each owner (or each purchaser). The breakeven amounts of regular that should be traded for 1,000 bbl. of premium when both parties agreed upon a value of straightrun gasoline are:

S.R. value (per bbl.)	Barrels
$3.00	1,150
3.50	1,110
4.00	1,075
4.04	1,070
4.40	1,049
5.28	1,000

The market prices would be more realistic if both parties valued straightrun gasoline at $3.62 and natural at $4.62. At such values, 1,000 bbl. of premium is exactly equal to 1,093 bbl. of regular.

All of this discussion is somewhat scholarly because prices are made by many other influences than the simple variables considered above. Among these are:

1. Needs of the refiner's regular customers. The needs of customers must be met in some degree at all times even if it means a smaller income or the customer may learn to trade elsewhere.

2. Similarly, company-owned or controlled filling stations or outlets must be served, even with the less valuable gasoline if that be necessary.

3. At times the tanks are full of the other type of gasoline. Such occasions should not, but do, arise.

4. The ingredients have different values to each refiner. One refiner has a special contract for natural gasoline, whereas another has a very large catalytic unit which makes his catalytic gasoline less costly, and still another refiner has cheap crude oil because of fortunate drilling ventures, etc.

5. Some refiners are striving to operate at a larger capacity and are willing to sell a little more cheaply if they can only operate at full or a large capacity.

6. A refiner may have contracted for too much crude oil, and he must move more products or lose his crude-oil contracts.

7. The accountants of each company have established preconceived ideas of the relative value of blending stocks. Thus, they each tend to come to their own sales values.

8. Some refiners spend money for sales activities in order to receive the best prices (or maintain extensive advertising campaigns) whereas other obtain sales simply by reducing the price a little.

9. Closely related to Item 8 is the good will and dependability that all organizations strive to maintain. Some have more of a reputation than others.

10. A refiner may have filled all of has available storage capacity with topped crude oil, hoping that the gasoline market would improve. He might then have to process so much through his catalytic unit that he has to reduce the price of catalytic or premium gasoline.

There is almost no end to the situations that may cause a single refiner to arrive at a selling price that is at variance with market prices.

Cost of Shipping Very Viscous Materials

"Are higher tanker rates charged for the shipping of very viscous fuel oils or crude oils?" W.P.C.

It is understood that the U. S. Maritime Commission allows a 5 per cent higher tanker rate when transporting exceedingly viscous materials. This is a reasonable figure because it is close to the cost of steam that is required to heat the material to 170° F. and maintain it at this temperature during loading and unloading, and during transport from Gulf Coast ports to the East Coast.

Such a temperature is high enough to allow rapid pumping of almost all semisolid materials. A higher temperature (about 210° F.) is required for rapid pumping of asphalt. The facilities for pumping that are available at most terminals allow rapid loading of materials if their viscosity does not exceed about 700 centistokes. More viscous materials cause slow pumping, and if the extra time for unloading amounts to as much as 10 per cent of the total elapsed time for the trip, the loss in revenue to the transportation agency amounts to 5 or 6 cents per barrel. It is obvious that it is much cheaper to heat the material than to incur delays in unloading.

Part 36 of a series

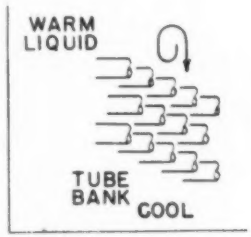
by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of BANK of COOL TUBES and a WARM LIQUID

Position of Tubes: Horizontal

Liquid Movement: Natural Convection.



EQUATION:

$$h_f = 0.47 \frac{k}{D_o}\left[\frac{D_o^3 \rho^3 g \beta \Delta t}{\mu^2} \cdot \frac{C\mu}{k}\right]^{\frac{1}{4}}$$

TECHNOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr. sq. ft. °F.

k - Thermal conductivity of liquid at t_f, BTU/hr. ft.² °F./ft.

D_o - Outside diameter of tube, ft.

ρ - Density of liquid at t_f, lb./cu. ft.

g - Acceleration of gravity. 4.17×10^8 ft./hr.²

β - Coefficient of volumetric expansion of liquid at t_f.

Δt - Temperature difference between tubes and liquid, °F.

μ - Viscosity of liquid at t_f, lb./ft. hr.

C - Specific heat of liquid at constant pressure, BTU/lb. °F.

t_f - Film temperature, assumed as arithmetic average of tube temperature and bulk liquid temperature, °F.

LIMITATIONS: Tubes should be at least one diameter apart. Tubes should be at least several diameters from bottom of vessel.

Data is erratic and results are likely to not be too accurate.

PHYSICAL CONSTANTS: The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ -- 130-148, 178-195, 1883.
μ -- 370-374, 1190, 1896.
β -- 100-200, 1075.
k -- 389-401, 1300, 1897.
C -- 208-236, 297, 1888, 1896.

REFERENCES:

1. Process Heat Transfer, Kern, pp. 215-217.
2. Heat Transmission, 2nd Edition, W. H. McAdams, pp. 226-261.
3. T. H. Chilton and others, Trans. A.I.C.E., 41, No. 1, pp. 97-119 (1945).
4. Petroleum Mech. Eng., 55, p. 5, (1933).

L 2 a

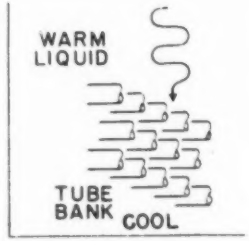
COEFFICIENTS of HEAT TRANSFER through FILM between OUTSIDE SURFACE of BANK of COOL TUBES and a WARM LIQUID

Tube Position: Horizontal

Tube Arrangement: Staggered

Liquid Movement: Turbulent

Direction of Movement: Normal to tubes.



EQUATION:

$$h_f = 0.33 \frac{k}{D_o}\left[\frac{D_o V_{max} \rho}{\mu}\right]^{0.6}\left[\frac{C\mu}{k}\right]^{0.33}$$

TECHNOLOGY:

h_f - Coefficient of heat transfer, BTU/ft.² hr. °F.

D_o - Outside diameter of tube, ft.

k - Thermal conductivity of liquid at t_f, BTU/ft. hr. °F.

V_{max} Maximum velocity of liquid through free space between front bank of tubes, ft./hr.

ρ - Density of liquid at t_f, lbs./ft.³

μ - Absolute viscosity of liquid at t_f, lbs./hr. ft.

K - Specific heat of liquid at t_f, BTU/ft. hr. °F.

t_f - Film temperature = 1/2 sum of outer wall temperature and main body temperature.

LIMITATIONS: The Reynolds number $(DV_{max}\rho/\mu)$ must be over 2000.

Equation above for data taken on bank of tubes 10 rows deep. For shallower tube banks $h_{f(corr)} = h_{f(calc)} \times$ correction factor as follows:

Rows	Factor	Rows	Factor	Rows	Factor
2	0.73	3	0.82	4	0.88
3	0.91	6	0.94	7	0.96
8	0.98	9	0.99	10	1.0

SIMPLIFIED EQUATION:

for water $$h_f = 370\left(1+0.0067 t_f\right)\frac{(V_{max}/3600)^{0.6}}{(12 D_o)^{0.4}}$$

PHYSICAL CONSTANTS:

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ -- 130-148, 178-195, 1883.
μ -- 370-374, 1190, 1896.
k -- 389-401, 1300, 1897.
C -- 208-236, 297, 1888, 1896.

REFERENCES:

1. Heat Transmission, William H. McAdams, pp. 226-269.
2. Elements of Heat Transfer and Insulation, Jakob & Hawkins, p. 115.
3. Introduction to the Transfer of Heat & Mass, Eckert, pp. 114-140.

L 2 c (1)

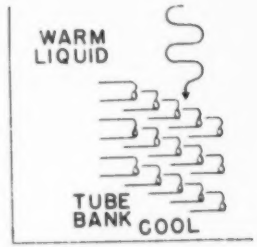
COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of BANK of COOL TUBES and a WARM LIQUID

Tube Position: Horizontal

Tube Arrangement: In line

Liquid Movement: Turbulent

Direction of Movement: Normal to tube



EQUATION:

$$h_f = 0.26 \frac{k}{D_o}\left[\frac{D_o V_{max} \rho}{\mu}\right]^{0.6}\left[\frac{C\mu}{k}\right]^{0.33}$$

TECHNOLOGY:

h_f - Coefficient of heat transfer, BTU/ft.² hr. °F.

D_o - Outside diameter of tube, ft.

k - Thermal conductivity of liquid at t_f, BTU/ft.hr.°F.

V_{max} Maximum velocity of liquid through free space between front bank of tubes, ft./hr.

ρ - Density of liquid at t_f, lbs./ft.³

μ - Absolute viscosity of liquid at t_f, lbs./hr. ft.

C - Specific heat of liquid at t_f, BTU/lb.°F.

t_f - Film temperature = 1/2 sum of outer wall temperature and main body temperature.

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Rows	Factor	Rows	Factor	Rows	Factor
2	0.73	3	0.82	4	0.88
3	0.91	6	0.94	7	0.96
8	0.98	9	0.99	10	1.0

SIMPLIFIED EQUATION:

for water $$h_f = 296\left(1+0.0067 t_f\right)\frac{(V_{max}/3600)^{0.6}}{(12 D_o)^{0.4}}$$

PHYSICAL CONSTANTS:

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ -- 130-148, 178-195, 1883.
μ -- 370-374, 1190, 1896.
k -- 389-401, 1300, 1897.
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2. Elements of Heat Transfer and Insulation, Jakob & Hawkins, p. 115.
3. Introduction to the Transfer of Heat & Mass, Eckert, pp. 114-140.

L 2 c (2)

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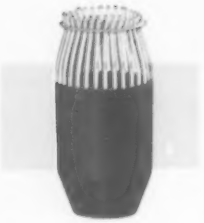
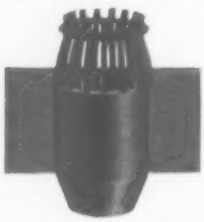
TYPE "J" cup lifts heaviest loads from wells of any depth. In the *yellow* box!

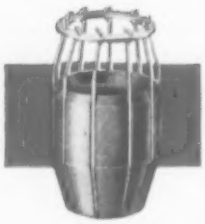


TYPE "L" Cup performs superbly on medium and light fluid loads in wells of any depth. Buy the pair in the *blue* box!



TYPE "GW" Cup is a special purpose cup that's tops for running in rough tubing —getting the last cupful of fluid in shallow wells. In the *green* box!

TYPE "K" Tubing Swab cup is a low-priced general purpose swab cup for depths up to 6000 feet. In the *red* box!



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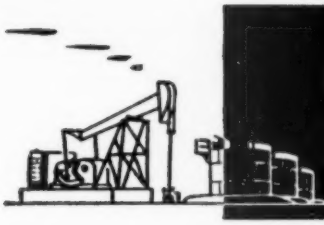

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ELECTRIC LOGGING—3

Resistivity of Water-Saturated Porous Formation

AS was pointed out in Installment 2 of this series, most minerals and rocks are poor conductors of electricity when they are in a dry state. As they occur in nature, however, porous rocks contain connate or interstitial water which is mineralized to a greater or less extent, and is therefore a fairly good conductor of electricity. The resulting resistivity of the water-saturated rock is a function of both the rock texture and the water resistivity.

The concept of the resistivity of a rock when it is saturated 100 per cent (R_o) with water of a given salinity (R_w) is of fundamental importance. If the rock is clean, that is it does not contain any conductive silt or clay, then a simple proportionality is found to exist:[1]

$$R_o = F R_w$$

where F is the formation factor and, in this case, is independent of R_w.

*Assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

Under the conditions stipulated the resistivities of water sands may show considerable variations depending on the concentration and temperature. For the resistivity values discussed previously and for a formation factor of 10 these possibilities exist:

Concentration (mg./l.)	Temperature (°F.)	R_w	R_o
7,000	68	1	10
40,000	68	0.2	2
90,000	68	0.1	1
7,000	212	0.3	3
40,000	212	0.06	0.6
90,000	212	0.035	0.35

It is apparent even at this stage that the resistivity which might be recorded on a log cannot be interpreted directly.

Even more significance may be attached to the resistivity of water sands when the question of pay zones is considered. In the case of oil or gas sands some of the interstitial water has been displaced by oil or gas. Since oil and gas are nonconductive an increase in the over-all resistivity of the rock and fluids contained therein, results. Within limits then, we are not concerned too much with how many ohms a sand displays on the log, but rather with how much of an increase is obtained over the value of the completely salt-water - saturated sand.

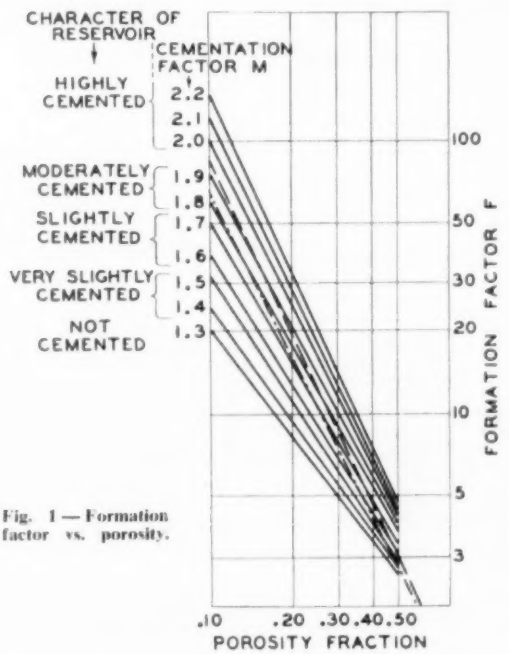


Fig. 1 — Formation factor vs. porosity.

Because the value of a water-saturated sand is of primary importance the significance of the formation factor will be considered further.

Essential difference between the flow of electricity and the flow of fluids through the pore space is in the type of movement. In the first instance the liquid does not move, but the current passes through the liquid with reasonable freedom. In the second case the fluid moves through the pore space. The ease with which the current flows depends to a larger extent on the amount of pore space, while the permeability depends on the distribution of pore space rather than on the amount of pore space. Nevertheless significant variations in formation factor for a given porosity are observed, and it is quite evident that the distribution of pore space must be taken into account.

Fig. 1[2] shows an interpretation of the results obtained by Archie who used a large number of sands and sandstones from the Gulf Coast area. A general solution is:

$$F = P^{-m}$$

where m is known as the cementation factor.

The value of m varies from 1.3 for unconsolidated sands to 2.0 or higher for cemented sandstones. There is no direct method for determining the value of m, but if formation factors are measured as well as porosities during the routine testing of cores a background of information will become available.

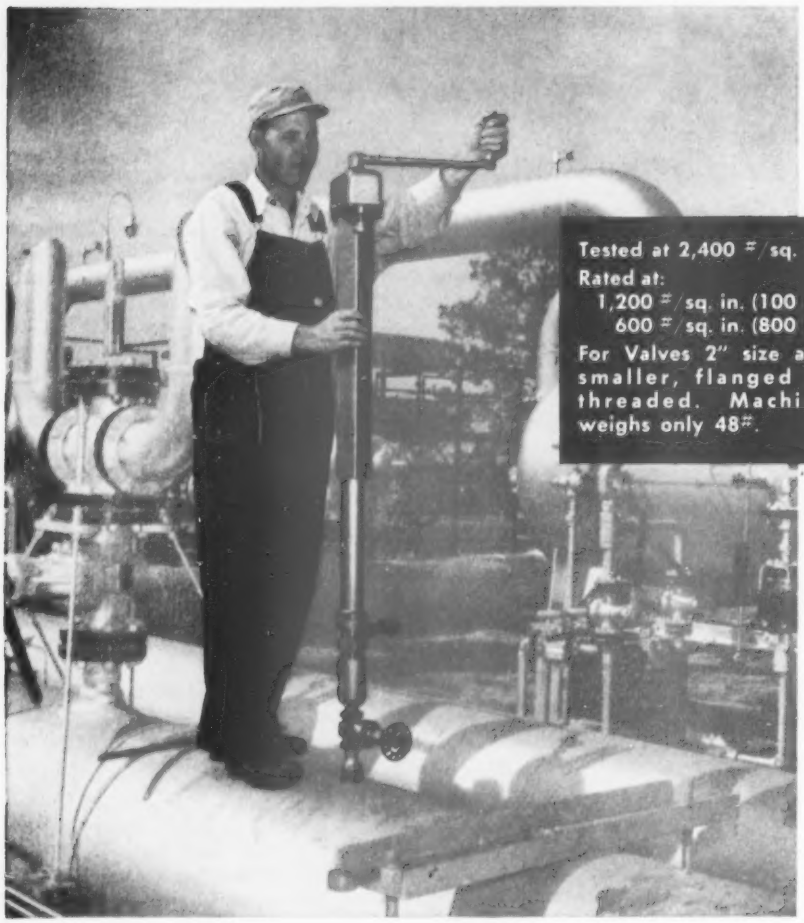
It is obviously important to know the value of m. For example, a sand which has a porosity of 15 per cent may have a formation factor of 12 if unconsolidated, and a formation factor of 60 if highly cemented. Therefore, if the porosity and the resistivity of the connate water are held constant the resulting resistivity may vary considerably with the degree of cementation.

References

1. Guyod, H., "Electrical Well Logging," reprint of Oil Weekly series obtainable from Halliburton Oil Well Cementing Co., p. 73.

2. Guyod, H., op. cit., p. 77.

here's the new . . . . .



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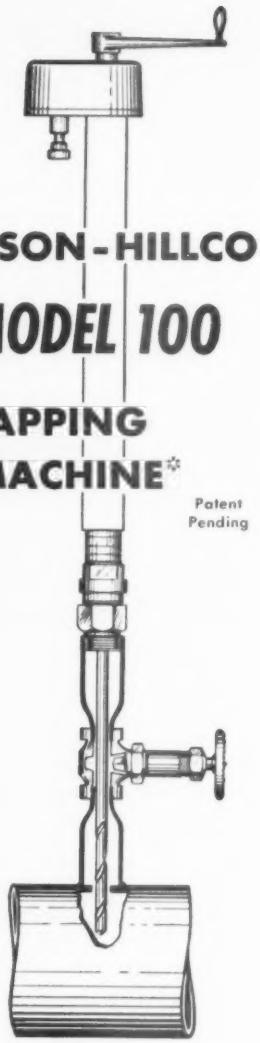

WmSON-HILLCO Model 100 Tapping Machines are used:

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Bacteriological Control*

DURING the last 10 years, particularly as a wartime development, we have all heard and read many accounts about the bacteria to be found in the soil. Some of these, such as penicillin, streptomycin, and chloromycetin, have been found to be very effective in fighting various diseases.

A type of bacteria found in many soils accounts for corrosion found in many pipe lines. This bacterial corrosion, or more specifically, anaerobic bacterial corrosion, is very often not recognized. This is because this bacterial corrosion is not so much a distinct type of corrosion, as it is a new way of looking at galvanic corrosion.

The modern concept of bacterial corrosion is that bacteria cause changes in the physical and chemical properties of the soil. By so doing, they either produce active galvanic cells because of differential aeration, or by the destruction of the protective hydrogen ion film which would normally collect along the cathode surface of a galvanic cell reducing its activity.

How it occurs . . . This bacterial corrosion differs from other types of corrosion in that it is caused by certain specific bacteria; that it only takes place under conditions where there is no free oxygen (anaerobic); and results in the production of sulfide as a corrosion product. Because the process is due to micro organisms and is therefore biological, it is affected by such factors as: the moisture content of the soil; whether the soil is neutral or acid; the abundance and type of organic matter, such as leaves, roots or other wood type fibers; and on the presence of the necessary chemical salts required as food for the bacteria.

In addition to all these requirements, the temperature of the soil around the pipe must be such as to permit growth of the bacteria.

In general, the bacterial effect may be visualized somewhat as follows: Under favorable conditions for growth, the required specific soil bacteria will feed on organic matter at or near the surface of the pipe, using up the oxygen content of the soil in the immediate vicinity. The result is the production of a galvanic cell. In this case, the differential aeration did not exist in the original ditch, but was the result of the action of the bacteria.

It has been noted from field surveys of pipe lines that areas found to be anodic (corrosive) during the summer time may be cathodic in the winter time. This variation is thought to be due to the action of specific soil bacteria and the fact that during the winter season, temperatures of the ground are so low as to prevent the activity and growth of this bacteria.

The only certain way of determining the presence of anaerobic bacteria, the particular kind of micro organism responsible for this type of corrosion, is to secure a sample of the soil from the immediate vicinity of the pipe and from that sample develop a bacterial culture. Inspection under a microscope will then definitely determine whether or not this particular specific bacteria is present in the soil.

Several other methods for predicting bacteriological corrosion had been proposed and tried. All of these depend upon using some other governing factor such as environment, food, products of corrosion, or the like, as an indication of this type of corrosion. None of these methods had been found to be 100 per cent accurate.

It really makes very little difference whether we have any definite method for predicting the presence of bacteria of the proper species to produce corrosion, because the resulting corrosion, if there is any, will be of the galvanic type. Thus if the proposed location for the new line is inspected for ordinary galvanic corrosion and, if the pipe line is reinspected after it has been in service, it can be determined whether or not new corrosive areas have been added due to the presence of this particular anaerobic bacteria.

Controlling Corrosion

THE control of corrosion can be accomplished by one or more of several general methods such as: selection of right-of-way to avoid obvious corrosive spots; coating the pipe with some kind of protective film or wrapper; or by forcing current to flow onto the pipe either through its entire length or at least within those areas at which current would otherwise be flowing off of the pipe due to the presence of natural galvanic cells or to the pipe being within the positive area of stray earth currents.

This latter means of protection can be accomplished in two general ways, that is, by creating a galvanic cell directly opposed to the natural galvanic cell of the pipe line, or by impressing electric current from an outside source directly on the pipe line.

Ordinarily the right-of-way for a line is chosen to approximate a straight line between two points and at the same time permit ease of construction and maintenance of the pipe line. A soil survey conducted along the proposed course of a pipe line sometimes indicates small corrosive areas which can be avoided without increasing either the installation cost of the line or its accessibility for maintenance.

* Taken from A Manual on Underground Corrosion, Columbia Gas System Service Corp.

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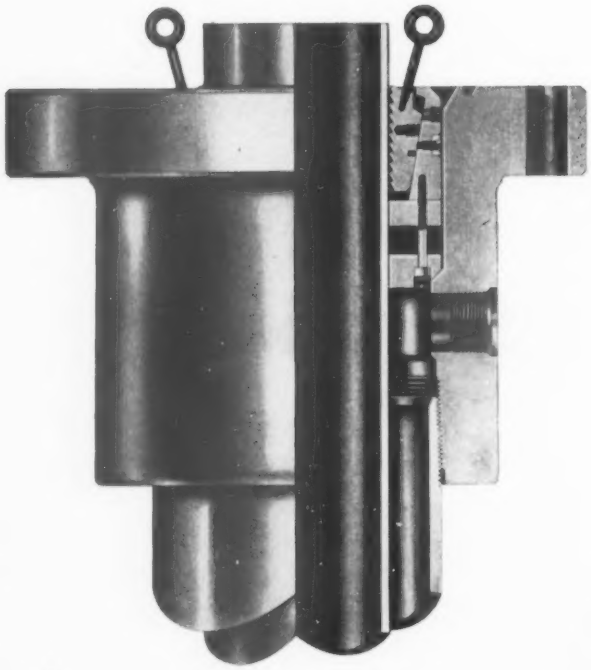
Ever since O-C-T pioneered the first deep well casing head that provided casing seal and suspension before blowout preventers were removed, we have recognized the need for this same safe, simplified type installation for a medium priced — medium duty casing head. Now, O-C-T research and study of casing head flexibility and safety have resulted in the introduction of this new O-C-T "C-20" Casing Head for medium depth wells. Check the features, advantages, and safety this new O-C-T head brings to the field . . . then write for the C-20 Brochure containing Engineering Nomograph for Calibrating Casing Loads and Pressures . . . Or ask your O-C-T Representative for details. Available through more than 700 supply store locations.



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EQUIPMENT MEN . . . in the News

Cooper-Bessemer Opens Edmonton Warehouse

VAN FOSSEN

Cooper-Bessemer of Canada, Ltd., recently opened its newest branch office and parts warehouse in Edmonton, Alta. Under direction of Edward D. Van Fossen, this latest addition to Cooper-Bessemer's worldwide sales and service facilities is planned to provide prompt factory service on parts for Cooper-Bessemer's diesel, gas-diesel, and gas engines as well as for its gas-engine-driven compressors.

Heading a factory-trained service staff at the Edmonton warehouse is Al Rothenbuhler, serviceman at Cooper-Bessemer's warehouse in Great Falls, Mont., since 1949. Assisting Rothenbuhler is William Munro, warehouseman who was formerly with the British Columbia Power Commission.

Van Fossen comes from Cooper-Bessemer's district office in Seattle, Wash. A factory-trained field engineer, with a mechanical-engineering degree from University of Washington, Van Fossen has extensive experience in many phases of power generation and compressor operation servicing the Canadian sector.

Kellogg Announces Formation Of Chemical Processes Div.

The rapidly increasing interest on the part of oil refiners in petrochemicals and the expansion of the chemical-process industries, was reflected recently by the announcement of The M. W. Kellogg Co. that it had established a special division devoted exclusively to the process design of plants for petrochemical and chemical fields.

In addition to the establishment of this new division within its process department, Kellogg, a subsidiary of Pullman, Inc., will further increase its activities in the petrochemical and chemical fields by additional emphasis in its research and development department and by continuing to acquire rights for new chemical processes which supplement designs already developed by the company. Charles C. King, who has been associated with Kellogg's process department for 14 years, is in charge of the new division.

Improved integration of Kellogg's process design and mechanical engineering work in the petroleum refinery field is expected to result from a complimentary change in organization which places L. J. Kelly, who has been a senior project manager in charge of the newly-established refinery process division. Both of these divisions will function under Paul F. Swanson, manager of the process engineering department.

Delta Engineering Sales Remodels Shreveport Plant

Complete renovation and remodeling of Delta Engineering Sales Co.'s offices has been announced by C. F. Clure, head of the company. Home offices and plant of Delta Engineering are located at Shreveport.

Continental to Move I.P.E. Building to Williston, N. D.

The store building used in The Continental Supply Co.'s 1953 I.P.E. exhibit will be moved to Williston, N. D. The supply company hopes to make the new building its standard store-type building. Since January 1952, Continental has had a store in Williston in a leased building. The new store building will be erected just north of the city on U. S. Highway 2-85. The Williston store is one of eight Continental stores located in the Rocky Mountain district. T. F. Morton is store manager in Williston and W. D. Craig, Casper, Wyo., is Rocky Mountain district manager for Continental.

Healy Named to Additional Sales Post by De Laval

W. J. HEALY

William J. Healy, sales manager of De Laval turbine division, has been appointed to additional post of sales manager for blower and compressor division, it was announced recently by W. A. Neumann, vice president of sales for De Laval Steam Turbine Co., Trenton, N. J.

Healy joined De Laval in 1928, serving as a sales engineer for Turbine Equipment Co., De Laval representatives in New England. In 1938 he transferred to De Laval plant sales staff, handling steam turbine, gears, compressors, blowers and pumps. In 1950 he was appointed head of turbine sales.

Marley Co. Relocates Houston Sales Office

A change of address and a new manager of its Houston, Tex. sales office have been announced by The Marley Co., manufacturer of cooling towers and water-cooling equipment.

To give necessary space for the expanding Houston plant, the Marley sales office has been moved from the plant to a separate office at 1601 Commerce Building.

Roy W. Maze has been appointed

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TROSTEL packings

manager of this sales office. Maze joined Marley in 1946 as advertising manager, and in 1950 he was promoted to managership of the merchandising-sales department. Maze received his B.S. degree in mathematics and physics from the College of Emporia, Emporia, Kansas and his masters degree from Kansas State College.

White Engineering Elects Jackson, Vice President

Harold P. Jackson of Jackson Heights, N. Y., has been elected vice president in charge of construction by J. G. White Engineering Corp., New York.

Serving in the White organization for over 30 years, Jackson has held many field assignments. Among his assignments in petroleum and chemical industry were positions as construction superintendent or project manager for installations in Oklahoma, Texas, Louisiana, and overseas in France, Venezuela, and the Netherlands, West Indies.

Since 1948 Jackson has been a director of Whitengeco Venezolana, S. A., the Venezuelan subsidiary of The J. G. White Engineering Corp.

Foster Cathead Appoints Peck Sales & Service

Foster Cathead Co., Wichita Falls, Tex., has announced the appointment of Marvin Peck of Peck Sales & Service, Houston, as its factory representative for the Houston Gulf Coast area. The appointment was effective June 1, 1953.

Christopher Completes Engineering Course

Jim Christopher, partner in the firm of Hill & Christopher, Los Angeles advertising agency for Halliburton Oil Well Cementing Co. and other petroleum service companies, has completed a course in petroleum engineering.

The basic course in petroleum engineering was given at University of California by Max Taves, Richfield Oil Co. engineer. It covers the field from geology to reservoir engineering.

Thornburg Is Made Division Sales Manager for Blackmer

R. THORNBURG

Ralph Thornburg has been appointed division sales manager of the south central division for Blackmer Pump Co. of Grand Rapids, Mich., according to announcement by Britton L. Gordon, president.

Thornburg was formerly associated with Yale & Towne Manufacturing Co., where he was sales manager of the pump division, and most recently with Marlow Pumps as Eastern district manager. He is a graduate of University of Oklahoma, and previously attended Drake University at Des Moines, Iowa.

Oden Makes Extensive Trip To South American Fields

A. C. ODEN

A. C. Oden, sales representative for McEvoy Co., has just returned from an extensive trip to several South American countries. Oden left Houston the first of March for Caracas, Venezuela, visiting fields in Eastern Venezuela. He also visited oil-company camps around Lake Maracaibo, Maracaibo, Venezuela; and Barranquilla, and Bogota, Colombia.

On his return trip, Oden spent several days in Miami, Fla. He also made a stop in New York City where he called on oil-company offices with E. F. Gahan, McEvoy Co. export agency.

Sales Personnel Promotions Announced by Blaw-Knox Co.

Two promotions in sales personnel of Blaw-Knox Co.'s chemical-plants division have been announced by G. E. Kopetz, vice president-assistant general manager of the division. Charles F. Hauck has been advanced to the position of sales manager of the division. He is succeeded as assistant sales manager by Bruce Alexander.

Hauck joined Blaw-Knox in 1951 as manager of sales promotion of chemical plants division, later being advanced to assistant sales manager.

Alexander joined the company in 1944 and for 3 years was in charge of sales and engineering of process equipment for Blaw-Knox Equipment division at Blawnox, Pa. He had earlier engineering experience with Aluminum Co. of America, and Colorado Fuel & Iron Corp.

Taco-West Changes Name to West Instrument Corp.

Richard K. West, president of Taco-West Corp., manufacturers of precision temperature controllers, recently announced change of the company's name to West Instrument Corp. According to West, this change will not affect officers or directors and will continue under the same management as in the past few years.

West Instrument Corp. will continue to operate at its office and plant in Chicago, and will serve industry all over the world with its 35 representatives in principal areas throughout the United States and abroad.

A. C. Swanson Wins J. H. Williams Prize

A. C. SWANSON

The winner of the Superchest No. 1001, offered as a first prize by J. H. Williams & Co. at the International Petroleum Exposition, was A. C. Swanson, of Service Pipe Line Co., Galesburg, Ill. Winners of second and third prizes were T. Meza Moreno, Tampico, Mex., and Ralph E. Cotterell, Newkirk, Okla.

Superchest No. 1001 is a chest containing 100 tools of select alloy steel. It is a matched assortment of wrenches in numerous patterns and detachable sockets with accessories in four drive sizes. Second prize was an assortment of ½ and ¾-in. square-drive socket wrenches and accessories. Third prize was a selection of 30 pieces for ½-in. square drive with metal case. These supersocket sets were awarded at the conclusion of exposition on May 23.

Superchest No. 1001 awarded A. C. Swanson

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We are sorry that we cannot help you, but the Barney Coupling (exclusive on Goodall Hose) is the only coupling that can be reset to make damaged hose as good as new. To the many users of Goodall Rotary Hose, we want to say again NEVER DISCARD A GOODALL ROTARY HOSE UNTIL YOU CONTACT US. To other rotary hose owners, we would like to suggest that you be sure next time that the hose you buy can be repaired. Thanks, Barney.

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TRADE LITERATURE

1 SUMP AND LINE TYPE FILTERS, 12-page catalog, includes all of the latest information and improvements in synclinal filters for hydraulic oils, coolants, and lubricants. Cutaway drawings, parts lists, dimensional charts, engineering data, typical installations, actual mesh sizes and flow and pressure drop tables are shown. *Marvel Engineering Co.*

2 PIPE AND PIPE FABRICATION. This 16-page catalog gives specifications for all sizes of pipe from ⅛ to 24 in. in diameter. Tables giving data and description, wall thickness, and weight, cover all schedule pipe from Schedule 20 through Schedule 160, also standard, extra long and double extra heavy pipe, spiralweld pipe, large o.d. pipe in all wall thicknesses, line pipe, electric-weld tubing, welding fittings and flanges, oil well casing and water well casing. *L. B. Foster Co.*

3 COMPRESSORS FOR LIQUEFIED GAS TRANSFER is a two-color bulletin which describes compressors for transfer of liquefied gas such as LPG and anhydrous ammonia. Bulletin also describes construction of unit by means of a sectional view. Graps indicating capacity of various machines under different pressure conditions are also shown. *Ingersoll-Rand.*

4 LIQUID-LEVEL CONTROL. Folder LL4-543 describes a single-thyratron electronic liquid-level controls operating without radio frequency from a single capacitive type probe, and illustrates single-unit control, probe, and alternative schematic arrangements for installation. Specifications are included. *Thermo Instruments Co.*

5 BULLETIN 546 is a comprehensive six-page multi-colored, illustrated catalog which describes line of air and gas compressors, Oilfreair and Oilfregas compressors, dry vacuum pumps, aftercoolers, airchek valves and centrifugal pumps for boiler feeding, general power plant and industrial applications. *Pennsylvania Pump & Compressor Co.*

6 PRESSURE REGULATING VALVES AND PRESSURE MASTER CONTROLS. This 12-page bulletin, printed in two colors and punched to fit three-ring binders, is profusely illustrated with photographs, cutaways and section views, dimensional and specification data. It describes in detail diaphragm-operated spring-opening and spring-closing regulating valves, pressure controllers, air locks, valve positioners, and selector panels. *The Swartwout Co.*

7 METERS & CONTROLS is a comprehensive catalog which offers information on complete line of meters, control equipment and engineering services. Fifteen measured variables common to power and process operations form the index for selecting appropriate metering and control equipment. Basic specifications, illustrations, and detailed literature references are included. *Bailey Meter Co.*

8 STUFFING BOXES. A four-page pamphlet, describes and illustrates regular type, regular flexible type, shut-off type, and shut-off flexible type stuffing boxes. Specifications are included on each type. *Le Grand, Sutcliff & Gell, Ltd.*

9 ZEOLITE WATER SOFTENERS. This technical bulletin discusses sodium and hydrogen cycles, zeolite softener design and operation. To assist in

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, June 29, 1953

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proper selection of control, bulletin also describes and illustrates four standard manual and automatic controls. Recommended flow rate tables and typical applications are included. *Graver Water Conditioning Co.*

10 **INSTRUMENT-QUALITY AIR** for all compressed-air applications is now available from ordinary plant air. Model B-30-D condensifilter is described in an illustrated bulletin which covers construction features, such as the disposable filter cartridge, technical data and dimensions. Bulletin includes applications and recommended usage. *Hankison Corp.*

11 **VALVES.** This 506-page completely illustrated catalog featuring a special 24-page valve-selector guide and over 100 pages of reference data, describes complete line of steel, iron, and bronze valves, and lubricating devices, boiler mountings, cocks and other products, including new "Non-Slip" handwheel. *The Lunkenheimer Co.*

12 **CONDENSER AND HEAT-EXCHANGER-TUBE HANDBOOK** contains 156 pages of helpful information to engineers concerned with selection of tubes, design, operation, and maintenance of all types of condenser and heat-exchanger equipment. It deals with properties of copper-base condenser tube alloys and their applications in chemical, petrochemical, power, and processing industries. *Bridgeport Brass Co.*

13 **PLASTIC MATERIALS OF CONSTRUCTION.** A 35-page booklet is now available on this material, which has been prepared specifically for corrosion engineers. *Atlas Mineral Products Co.*

14 **BULLETIN SE-5** describes and illustrates external gear and bearing bracket-type screw pumps. Applications, construction features, and approximate dimensions are discussed. *Sier-Bath Gear & Pump Co., Inc.*

15 **ALL ABOUT POWER FLEXIBLE DRIVES** lists and illustrates a complete line of flexible drives and accessory tools, including boiler-tube cleaning equipment, grinders, scalers, shapers, heads, and extensions. *Flexible Drives (Gilmans) Ltd.*

16 **DOG-HOUSE POWER,** an eight-page booklet, tells a picture story of the uses of Caterpillar diesel electric set power with emphasis on simplicity of operation, portability and long service life. *Caterpillar Tractor Co.*

17 **EVAPORATIVE COOLERS,** for cooling engine jacket water, lubricating oil, steam, natural gas or other fluids and also for condensing steam, natural gas or other fluids, are described in a new 12-page, two-color catalog. Mechanical specifications, operating principles, dimensions, capacities, and construction features are given. *Young Radiator Co.*

18 **LONG-STROKE HYDRAULIC PUMPING UNITS FOR STRIPPER WELLS.** This new illustrated bulletin gives principal features and specifications of Carter units and describes variable cycle, which permits operation approaching constant flow. A table of maximum capacities is included showing field of application of these units. *S. C. Carter Co., Inc.*

19 **FUEL FILTRATION** for crude and residual fuels, diesel, gasoline and other refined fuels, natural gas, sewage gas, and other gaseous fuels is discussed in this four-page bulletin. It is profusely illustrated with on-the-job application photographs. *Winslow Engineering Co.*

20 **FABRICATION AND WELDING** is the title of an article on fabricating modern pressure vessels. List No. 880 covers plant lay-out, plate and bar bending, welding, profiling, and shaping equipment. Part II covers testing, annealing, and installation of pressure vessels. *G. A. Harvey & Co. (London), Ltd.*

21 **TITRILOG.** Bulletin CEC 1810B describes this unit, offered in cabinet model, and portable style, as an economical means of continuously, automatically recording concentration of sulfur compounds in gas streams or atmosphere. Measurement and control of sulfur content of natural gas is an important application of the Titrilog. *CEC Instruments, Inc.*

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, June 29, 1953

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DIGEST OF NEW EQUIPMENT

IT'S NEW ✓ CHECK IT

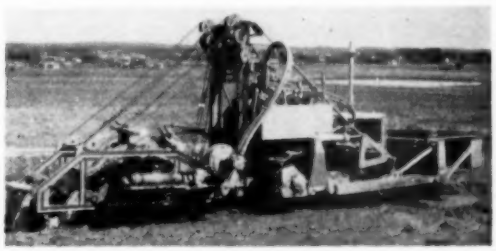
by Dan B. Miller

22 TOURNATRAIN is a rubber-tired locomotive and freight-car combination capable of economic operation over pathless desert sands or a cheaply constructed road. The heart of the Tournatrain is the electric wheel

which carries a large pneumatic tire and has within its rim an electric motor and gear reduction. These electric wheels are being built in different sizes to take tires from 5 to 10-ft. in diameter. Every wheel of the Tournatrain is a rubber-tired, self-propelled electric wheel. The electric wheels derive their energy from the locomotive which mounts diesel-engine-driven electric generators. The operator, from his cab on the locomotive, applies power at will to all wheels. In this way each freight car provides propulsion for its own load; each car of the Tournatrain pushes and pulls at the same time. The same electricity that drives the wheel can be used to hold it back going down hill. Each car is coupled to the car ahead of it in such a way that it follows in the same tracks. The path of the locomotive is duplicated in its turn by each car of the train. *R. G. Le Tourneau, Inc.*

IT'S NEW ✓ CHECK IT

23 UNIMATIC DETACHABLE DITCHER is a new approach to the problems of trenching and backfilling on pipe-line construction. The ditcher will normally be used on a tractor with a hydraulically operated angle dozer. Once the original installation of the ditcher to the tractor has been made so the tractor can be detached from or attached to the ditcher by two men in less than 15 minutes by removing four pins and unscrewing the self-sealing hydraulic couplings. The tractor is then free for jobs such as clearing right-of-way, backfilling the ditch, or towing service. When operating as a ditcher all of the power is supplied by the diesel engine to hydraulic pumps and then through control valves to hydraulic motors. The digging wheel is powered by a hydraulic motor of adequate power for digging in hard shale, but because of a relief valve the wheel will stall when a pipe or some other hidden obstruction is encountered. The conveyor is driven by two hydraulic motors mounted on the head and tail pulley shafts. The conveyor may be started, stopped, and reversed independent of the operation of the digging wheel. The depth of the ditch is controlled by two hydraulic-motor-powered cable winches with built-in brakes to give the operator finger-tip control of the position of the digging-wheel frame. An important feature of this ditcher is the Unimatic drive. A small hydraulic motor with suitable flow-control valves supplies power through a gear reducer and the standard tractor transmission to permit the tractor to move either forward or backwards at speeds as low as 4 in. per minute, or as high as 20 ft. per minute with the same drawbar pull as the tractor would have if operated in the conven-



tional manner through the master clutch and transmission. Changing from Unimatic drive to standard tractor drive is accomplished by disengaging a jaw clutch and engaging the master clutch. *Unimatic Corp.*

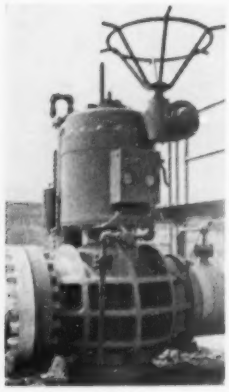
IT'S NEW ✓ CHECK IT

24 K-67 INDUSTRIAL ENGINE. The new model was designed to furnish power for oil-well drilling, water pumps, generators, blowers, snow plows, mud pumps, cranes, and compressors. It has six cylinders with 7-in. bore and stroke, 1,616 cu. in. displacement, and has a maximum horsepower rating of 280 at 1,350 r.p.m. The K-67 will operate with equal efficiency on natural-gas, gasoline, butane, or sewage gas with provisions for correct compression ratios and necessary accessories for the particular fuel to be used. Other features include a seven-bearing crankshaft, precision-type main and connecting-rod bearings, pressure lubrication to all moving parts, cam-ground aluminum pistons, nonpositive rotating-type overhead valves, and gear-driven oil and water pumps. *Climax Engine & Pump Manufacturing Co.*

KEEP INFORMED ✓SAVE TIME ✓TEAR OUT CARD ✓CHECK IT ✓MAIL IT

This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

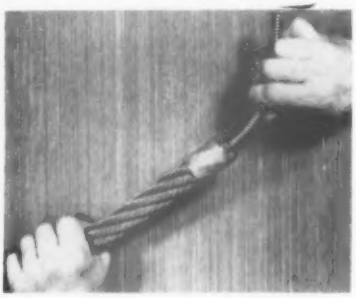
OIL AND GAS EQUIPMENT Digest — IT'S NEW — CHECK IT



25 SHAFER PLUG-VALVE OPERATOR can open or close a 24-in. plug valve in 2 seconds without mechanical shock. This is one of several at a gas-compressor station all interlocked for quick closure when actuated from one of three emergency remote manual-control stations. Each is also actuated automatically in event of a main-line break. The Plug-Valve Operator is easily installed on existing 1½ to 30-in. plug valves. It may be powered with gas, air, or liquid at pressures from 60 to 1,000 psi. Its single moving part applies torque directly on and about the plug-valve stem like a two-handled wrench. There are no gears or levers, and no side thrusts. It is available for manual, cyclic, or automatic remote-control pneumatic, hydraulic, or electric installation. Though principally used on large high-pressure gas lines, it is readily adaptable to a wide variety of uses in refineries and industrial plants because of its power, simplicity, and ease of control. *Shafer Valve Company, Inc.*

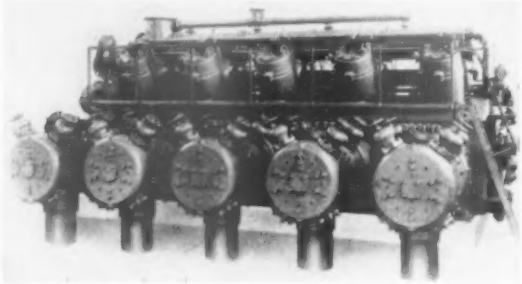
IT'S NEW — CHECK IT

26 SPRING-CENTER WIRE ROPE has been engineered for use in rotary-drilling rigs. The spring center of this new wire rope has a tremendous ability to resist crushing. In addition, the void inside the spring provides a reservoir for giving more constant maintenance of lubrication. Field tests made with the new spring-center wire rope indicate long life despite hard usage. Other advantages claimed for the new rope are: Extreme flexibility providing many points of contact between outer strands and the core; firm internal support for outer strands; wide distribution of internal pressures; greater ability to snap back to original shape and diameter, and reduced fatigue. Spring-center wire rope will be stocked in ⅞, 1, 1⅛, and 1¼-in. diameter. Other standard sizes will be stocked as needs appear. *Jones & Laughlin Steel Corp.*



IT'S NEW — CHECK IT

27 NEW GMVA ENGINE DEVELOPMENT. In addition to cutting fuel consumption to as low as 7,500 B.t.u. per horsepower hour, the new engine development produces over one-third more horsepower per cubic foot of space. Ultimate possibilities of this development are of significance to pipe lines, refineries, natural-gasoline plants, and chemical processing plants. The output per cylinder is developed with 15 per cent less heat load on the engine. A greater range in compressor operation made possible by the GMVA development permits handling overloads up to 35 per cent. For example, in operation on natural gas as transmitted through cross-country pipe lines, the GMVA efficiently carries overloads without detonation up to the breakdown point in load. The new GMVA compressor produces 135 hp. per cylinder, yet with less mechanical load on the engine parts than was ever possible before. Cylinder-firing pressures are lower. Exhaust temperatures have been reduced as much as 100°. Considering the cooler operation, life of key component parts, such as valves and piston rings, has been increased proportionately. *Cooper-Bessemer Corp.*



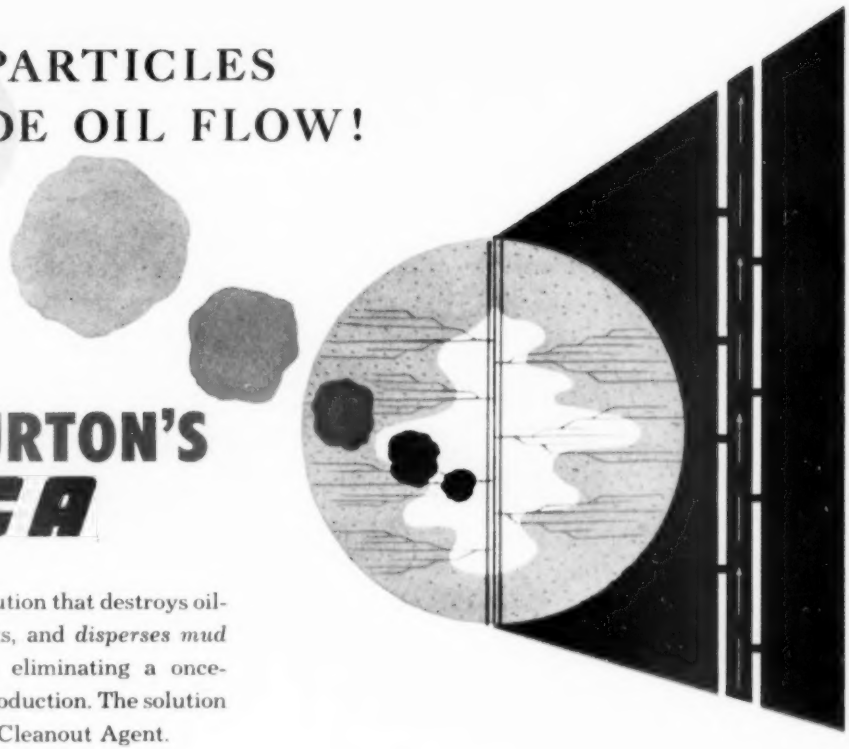
IT'S NEW — CHECK IT

28 TEXSTEAM TEX-LIFT, a straight-lift hydraulic pumping unit, combines simplicity and dependability with the recognized advantages of the slow-speed, long-stroke hydraulic pumping unit. Incorporating an improved hydraulic system with a minimum of controls, the Tex-Lift is furnished in two sizes, with stroke lengths ranging from 4 ft. to 6 ft. in one, and 6 ft. to 10 ft. in the other, with infinitely variable speeds. Maximum recommended polished-rod loads are 10,000 lb. Power is supplied by an electric motor or gasoline engine mounted on a skid with an oil reservoir. When desired, the power unit can be equipped to operate two pumps. All hydraulic lines are protected by screens and filters. It is especially recommended for use on stripper wells and water-drive production where the factors of cost, weight, and installation, imposed by beam-type units, prohibit profitable operations. Speed is changed by regulating two control valves. To change the length of stroke it is necessary to open one valve on the hydraulic cylinder and close another. *Texsteam Corp.*

IT'S NEW — CHECK IT

29 MODEL 251A, A NEW, LIGHT-WEIGHT, HEAVY-DUTY DIESEL ENGINE, for stationary and portable service, is a 6-cylinder, 4-cycle turbocharged diesel of 9-in. bore and 10½-in. stroke, rated at 690 hp. at 900 r.p.m. The engine is intended for continuous duty or stand-by purposes and is designed for such typical applications as oil-well drilling rigs, crude-oil and product-pipe-line pumping, electric-power generation, and for portable units mounted on skids, trailers, or rail cars. The engine base and frame are structural steel, resulting in light weight with no reduction in strength, and permitting operation on light and economical foundations. Net weight of the engine is 21,350 lb. dry and 22,500 lb. wet. Of compact design, it is

DISPERSES PARTICLES THAT IMPEDE OIL FLOW!



HALLIBURTON'S MCA

A potent chemical solution that destroys oil-water emulsion blocks, and *disperses mud particles* virtually is eliminating a once-serious threat to oil production. The solution is Halliburton's Mud Cleanout Agent.

The remarkable qualities of this double-action agent that enable it to break water blocks, reduce water-swollen bentonite, destroy emulsions, and disperse mud particles are a result of its precise blending.

MCA, an exact compound of hydrochloric acid and Halliburton's Morflo, has been equally successful in rejuvenating old wells and as a completion process for new ones. Results have been outstanding in several cases.

For example, one old well in the Refugio-Fox Field of Texas increased from zero to 30 bbl. a day after a 500-gallon MCA treatment. Output of another well given the same treatment went from zero to 80 bbl. Still another old well, given a 100-gallon treatment, climbed from 37 to 260 bbl. Of three new wells treated in the Cree-Sykes Field, Texas, two were given 750-gallon applications. One well's production increased from 24 to 64 bbl. per day; the other from 15 to 80 bbl. The third well went from a trace to 140 bbl.

MCA is highly effective when pay zones are blocked by water or bentonite, or by a combination of the two. But it is not a cure-all. It cannot boost production when no oil is present. Yet even then, use of the solution can be of value. If pumping of the mud-cleanout material can determine quickly the productivity of a doubtful play, money can be saved in future work.

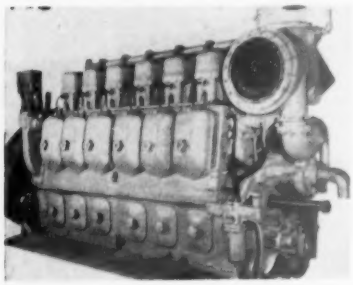
The amount of MCA to be used and the number of applications depends on the formation and well characteristics, factors considered carefully by experienced Halliburton specialists.

This effective emulsion-cracking agent could be valuable to you in completing a well, reviving an old one, or used prior to a squeeze cementing job. Just phone your nearby Halliburton representative for MCA service. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

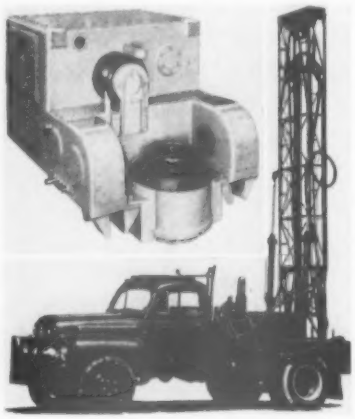
YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!

11 ft. 5-in. long, 7-ft. 5-in. high and 4-ft. 11-in. wide. Power takeoffs for oil-well drilling rigs are an integral part of the engine; therefore, there is no alignment problem with the engine crankshaft and overall length is not extended. The engine features a lubrication oil system built as an integral part of the engine and mounted on the cylinder block. The integral system includes the lube-oil sump, oil pump, cooler, filters, strainers, and oil-pressure regulating valve. *American Locomotive Co.*



IT'S NEW ✓ CHECK IT

30 T I DRILL. The heart of this unit is the integrated power drive. All the components necessary for the transfer and control of power have been brought together in a single case with a single group of controls. Rotary table, pull-down drive, kelly hoist, hoist drum, and pump drive are so integrated with the primary power drive that transfer of power for all drilling operations is accomplished in a single unit. All moving parts are protected from dirt and moisture and continuously lubricated with filtered oil spray. By mounting the mast and rotary table direct to the power drive's rigid steel housing, proper transfer of forces and alignment of rotating parts is assured. Alignment of parts within the case is obtained by line boring all mounting holes for components and bearings. Wear and tear on the whole rig, from truck chassis through the power train to the engine, has been greatly reduced by using hydraulic coupling to the rotary table and pull-down. Transfer of shock from the drill stem is at a minimum. Three-point mounting isolates the power drive from the stresses and strains of the truck frame when traversing rough terrain. *Texas Instruments, Inc.*

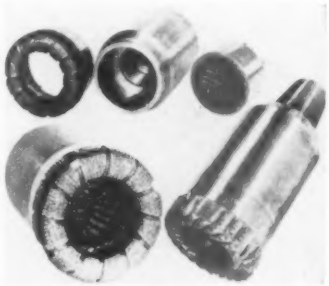


IT'S NEW ✓ CHECK IT

31 NEW NORELCO PORTABLE INDUSTRIAL X-RAY UNIT that fits into the trunk of an automobile is designed specifically for rapid inspection of welds, pipe lines, and power-plant equipment. The new unit is unusual since the X-ray-tube head also contains the high-tension generator of 150,000-volt output. It weighs only 143 lb. The accompanying control is equally compact and weighs only 80 lb. The arrangement of tube and generator in one housing eliminates the need for high-tension cables, always a possible source of trouble. The X-ray tube is fan-cooled and has an end port which provides maximum usefulness in handling various types of close-in work. Combination tube and generator unit has a diameter of 10⅝ in. and is 35 in. long. Where desired, the diameter can be reduced to 8½ in. by eliminating the removable guards. Power supply can be either 115 or 230 volts a.c. *North American Philips Company, Inc.*

IT'S NEW ✓ CHECK IT

32 SPIRAL-SET DIAMOND BITS. While the diamond is the hardest substance known, its tensile strength is low. The Spiral Set is designed to insure maximum usage of the hardness of the diamond and at the same time resist breakage, or shearing of the stones. In these core bits the diamonds are set to perfect contour so that the leading, or cutting point of any diamond can be neither high nor low with respect to other diamonds equidistant from center. Further, the diamonds are set at a low-cutting angle, 8° to 25°, and are actually in compression when engaging the formation. Thus they are able to withstand far greater loads without breakage. The Spiral-Set design controls the bite of the diamond, in a horizontal plane, into the formation. Each diamond in a given spiral is progressively farther from center by precise measurement. Adjacent spirals provide the maximum overlap without circular planes or weakness. This bit design provides maximum back-up with matrix metal to resist breakage as well as cutting relief angle behind each diamond. This relief angle terminates in a secondary fluid groove so that cuttings are removed immediately, thus providing adequate cooling action. Additional main-fluid grooves are adequate for circulation requirements. *Diamond Coring, Inc.*



IT'S NEW ✓ CHECK IT

33 SUPER-TOUGH HAT differs from other hats principally in that the shell is molded in one piece of lightweight, moisture-proof plastic. It passes all required tests for impact-resistance, pierce-resistance, and dielectric strength. It is also resistant to many industrial acids and caustics in commonly encountered solutions. There are two styles: No. 1 has a "buffer"-type vinyl headgear with genuine-leather sweatband and an elastic chin strap. No. 2 has a lighter-type vinyl headgear, also with genuine-leather sweatband. Either style of headgear is attached to the hat by six suspension points which are molded into the interior of the shell so that no rivets or lacing pierce the hat. *Willson Products, Inc.*

Pipe-Line Construction

PIPE-LINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipe-line companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the company name.

Crude-Oil Pipe Lines

• **California - Oregon Pipe Line System**—103 miles, 6-in., proposed, Crescent City, Calif., to Medford, Oregon.

• **R. A. Goodall.**—45 miles, 6-in., planned, Little Beaver to Merino, Colo. (To connect with Sterling system).

• **Gulf Refining Co.**—55 miles, 12-in., planned, Bay Marchand to Plaquemines, La.

Humble Pipe Line Co.—71 miles, 16-18-in., under way, East Texas to Louisiana-Texas border. (30 miles of 16-in., and 41 miles of 18-in.) O. R. Burden Const. Co. Completion date 10-53.

Start 7-1, Longview to Louisiana border.

• **Interstate Oil Pipe Line Co.**—116 miles, 22-in., planned, Shreveport to Baton Rouge, La.

Interstate Oil Pipe Line Co.—55 miles, 16-in., under way, Raceland to Anchorage, La.

Plaquemine to Anchorage, La.

Lakehead Pipe Line Co.—635 miles, 30-in., under way, Superior, Wis., to Sarnia, Ontario, Canada.

Contracted, Superior to Wisconsin-Michigan state line. Mahoney Contr.

Mackinac City along Straits of Mackinac to Red Oak, Mich. Bechtel Corp.

Red Oak via Bay City to International Boundary south of Port Huron on St. Clair River. Conyes Const.

Water crossings of Mackinac, Saginaw, and St. Clair rivers. Merritt - Chapman & Scott Corp., W. J. Meagher & Sons, Inc., and Midwestern Constructors.

Under way, Michigan-Wisconsin State line through Crystal Falls to Cooks, Mich. Anderson Bros. 9-15-53.

Under way, Cooks to St. Ignace, Mich., on Straits of Mackinac. Midwestern Constructors, Inc.

• **Magnolia Pipe Line Co.**—29 miles, 8-in., planned, Midland County, Texas area.

• **Pasotex Pipe Line Co.**—146 miles, 10-in., planned, Snyder to Wink, Tex.

Phillips Pipe Line Co.—26 miles, 8-in., under way, northeast area of Andrews County, Texas.

18 miles, under way, gathering lines, northeast area of Andrews County, Texas.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles Harbor, Calif.

• **Roosevelt Oil & Refining Corp.**—22 miles, 4 and 6-in., planned St. Helens to Norwich, Mich.

Service Pipe Line Co.—153 miles, 12-16-in., under way, Tioga-Beaver Lodge area to Mandan, N. D. O. R. Burden Const. Corp.

55 miles, 4-6-8-in., under way, Tioga-Beaver Lodge area gathering system. C. P. Bartley & Son.

Texas Pipe Line Co.—34 miles, 6-in., under way, Sour Lake to Port Arthur, Tex. Houston Contracting.

45 miles, 8-10-in., under way, between Erath and Bayou Sale stations. Houston Contracting Co.

• **West Coast Pipeline Co.**—960 miles, 20-22-in., planned, Wink, Tex., to Norwalk, Calif.

Products Pipe Lines

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed, Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Buckeye Pipe Line Co.—370 miles, 10-14-16-in., under way, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y. 9-53.

Guthsville to Dupont, Pa. Pipe Line Const. & Drilling Co.

Dupont north to Pennsylvania-New York state line. Fulghum Contr. Corp.

Pennsylvania-New York state line to Auburn, N. Y. Williams-Austin.

Auburn to Syracuse, N. Y. Williams-Austin.

Auburn to Caledonia, N. Y. Universal Map and Survey Co.

• **Continental Pipe Line Co.**—(Yellowstone Line)—600 miles, 8-in., planned, Billings, Mont., to Spokane, Wash. (Joint ownership of Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co.)

Harbor Products Systems—36 miles, 16-in., under way. Woodbury Junction, Philadelphia to Trembley Point, N. J. Construction Service Co. and H. C. Price Co. (Joint ownership of Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co.)

Indiana Farm Bureau Cooperative Association, Inc.—180 miles, 8-in., under way, Mt. Vernon to Indianapolis, Ind. R. B. Potashnick, contractor. 8-15-53.

52 miles, 4-in., under way, Indianapolis to Peru, Ind. R. B. Potashnick, contractor.

• **Inland Empire Pipe Line Co.**—504 miles 10-in., proposed, Billings, Mont., to Spokane, Wash.

• **Kaneb Pipe Line Co.**—236 miles, 8-in., planned, Wichita and Potwin, Kans., to Fairmont, Neb. 9-53.

• **Phillips Petroleum Co.**—54 miles, 6-in., planned, Goldsmith to Borger, Tex.

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex.

Plantation Pipe Line Co.—82 miles, 14-in., start 7-1. Charlotte to Greensboro, N. C. Anderson Bros.

Salt Lake Pipe Line Co.—140 miles, 8-in., under way, Pasco to Spokane, Wash. Lyles & Young Co. Completion date 10-1-53.

• **Standard Oil Co. (Ind.)**—Planned, Mandan, N. D., to Moorhead, Minn.

Standard Oil Co. (Ind.)—243 miles, 10-12-in., under way, Whiting, Ind., to River Rouge, Mich.

Porter, Ind., to Colon, Mich. Somerville Const. 9-1-53.

• **Sunray Oil Corp.**—440 miles, 10-in., planned, Duncan, Okla., to Mississippi River.

Sun Pipe Line Co.—50 miles, 8-in., under way, Toledo, Ohio to Inkster Junction west of Detroit. 10-53. R. L. Coolsaet Const. Co. and Poston Pipe Line Co.

Texas Pipe Line Co. (Evangeline Products Systems)—196 miles, 16-in., under way, Port Arthur, Tex., to Baton Rouge, La. Panama-Williams Co. Completion date 7-53.

• **United States Pipe Line Co.**—1,799 miles, 22-26-in., proposed, Beaumont, Tex., to Newark, N. J.

Beaumont, Tex., to Memphis, Tenn.

Memphis, Tenn., to Louisville, Ky.

Louisville, Ky., to Newark, N. J.

Laterals to Paducah and Lexington, Ky.

• **Williston Basin Pipe Line Co.**—244 miles, 8-in., proposed, Laurel-Billings, Mont., refineries to Glendive, Mont.

• **Wolverine Pipe Line System**—200 miles,

WALKER CENTRIFUGE MACHINE

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The compact, streamlined Walker Centrifuge Machine fits snug into your car—makes gauging simple and handy. It measures accurately the BS and water content of crude oil. Requires minimum maintenance because a direct drive to the tube head eliminates unnecessary bearings which before were subject to dirt. Aluminum casting construction makes it light, rugged, spark resistant. Speed adjustable up to 2450 RPM (required ASTM speed, 1750). Six volts and five and one-half amps make it easy on the car battery.

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FOR 719 days, this Wico Model XHD Magneto operated non-stop on a 40 HP, 900 rpm engine in an oil field. It had only a short "time-out" when it was transferred to a different engine—but with this single exception, it racked up a record of 17,250 hours of continuous operation.

It's service like this that has earned the Wico XHD its reputation as a heavy duty magneto. Long life is built into every part. The coil has a surge winding of larger wire to absorb the electrical strain and prevent breakdown . . . and it's protected by a solid, molded insulating jacket. Big tungsten contacts, single piece cast rotor and hefty pre-lubricated bearings are further evidence of design that withstands the roughest oil field service.

To give your engines a hot, lively spark—not just day after day, but month after month—always choose Wico Magnetos. Write to us for full information, or see your nearest Wico Service Station.

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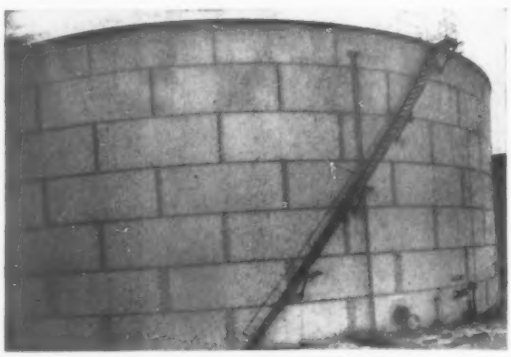

117'2" x 41'9½" Cone Roof—Excellent condition. Priced low for immediate sale. Terms can be arranged for reliable parties. Tanks—Los Angeles area.

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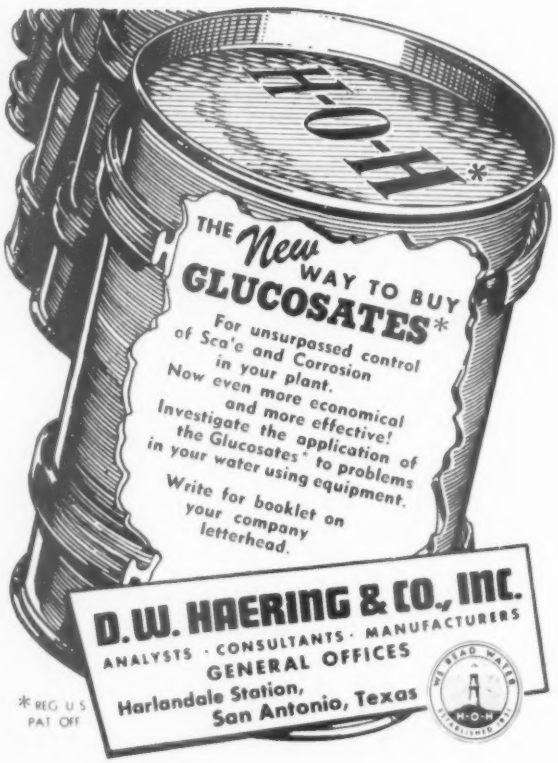
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14-in., planned, Chicago to Toledo and Detroit. (Joint ownership of Shell, Texas, and Cities Service). Completion date 1-54.

Natural-Gas Pipe Lines

• **Arkansas-Missouri Power Co.**—140 miles, 2 to 10-in., planned, St. Francis River, Clay County, Arkansas, to near Campbell, Mo.

• **Associated Natural Gas Co.**—88 miles, Missouri.

• **Atlantic Seaboard Corp.**—29 miles, 26-in., proposed, looping along Cobb-Rockville line.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Chattahoochee Natural Gas Co.**—70 miles, proposed, Floyd County, Georgia, to Dalton, Ga.

• **Chicago District Pipe Line Co.**—35 miles, 24-30-in., proposed, Chicago area.

• **Cities Service Gas Co.**—18 miles, 16-in., Lawrence and Newton counties, Missouri.

69 miles, 20-16-in., proposed, Cleveland, McClain, and Garvin counties, Oklahoma.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in. proposed, Green River, Wyo., to Denver, Colo. 1954.

116 miles, proposed, Colorado, Oklahoma, Texas, and Kansas. 1953.

• **Cumberland and Allegheny Gas Co.**—31 miles, 12-in., proposed, Garrett County, Md., to Keyser, W. Va.

East Tennessee Natural Gas Co.—158 miles, 16-in., start July, Knoxville to Kingsport, Tenn. (58 miles of laterals.) 11-53.

• **El Paso Natural Gas Co.**—1,778 miles, proposed, Permian basin, New Mexico, Texas and Colorado.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Gulf Interstate Gas Co.—860 miles, 30-in., under way. Acadia Parish, La., to Boyd County, Ky. H. C. Price and Houston Contracting. 11-54.

Under way (north section) Kincade, Tenn., to Kenova, W. Va. H. C. Price.

(Southern section) Lake Charles, La., to Kincade, Tenn. Houston Constr.

230 miles, gathering lines, contracted, Associated Pipe Line Contractors, Anderson Bros., Williams Bros.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—32 miles, 12-in., planned, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hansock to Sanford, N. M.

46 miles, 12-in., under way, Tioga and Broome counties, New York. H. L. Gentry Const.

22 miles, 12-16-in., under way, Binghampton, N. Y.

• **Interstate Power Co.**—26 miles, 8-in., proposed, from Nat. Gas P. L. Co. America line near Hooppole, Ill., to Clinton, Ia.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., start last half '53, Washington County to Cedar Rapids, Iowa.

Kansas-Nebraska Natural Gas Co., Inc.—54 miles, 4-6-in., under way, Neligh to Hartington, Neb. Brodie Constr. 9-53.

42 miles, 4-6-in., under way, Neligh to O'Neil, Neb. Brodie Const. 9-53.

61 miles, 3-2-in., under way, lateral lines from Broomfield through various towns to Wausa, Neb. Brodie Const. Co. 9-53.

• **Lone Star Gas Co.**—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

35 miles, 12-in., proposed, southeastern Schleicher County.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

Michigan Gas Storage Co.—30 miles 26-in., under way, Lainsburg Junction north. Mahoney Contracting. 7-1-53.

• **Mississippi River Fuel Corp.**—109 miles, 10-18-in., planned, laterals in Woodlawn and Waskom gas fields, Texas.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo.

• **Montana Power Co.**—52 miles, 16-in., planned, Canada-Montana border to Cut Bank, Mont.

• **Morganfield Natural Gas Co.**—31 miles, 4-6-in., planned, through Sturgis, Providence, Clay, Diamond, Wheatcroft, and Sullivan, Ky.

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• **Natural Gas Producers Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **Nevada Natural Gas Pipe Line Co.**—114 miles, 12¾-in., proposed, Topock, Ariz., to Las Vegas, Nev.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **New York State Electric and Gas Co.**—59 miles, 8-10-24-in., proposed, Oneonta and Norwich to DeRuyter, N. Y.

New York State Natural Gas Corp.—104 miles, 14, 16, 20-in., under way, looping on Westmoreland, Armstrong, and Tioga counties, Pennsylvania. (Includes 17 miles, 16-in., in Potter County, Pennsylvania, and 21 miles 14-in., replacement in Line No. 507, New York.)

Colesburg Junction to Sabinsville, Pa. (begin at completion of Angelica job), Williams-Austin. Howard Bauer, superintendent.

21 miles, Columbiana and Stark counties, Ohio.

• **New York State Natural Gas Co.**—75 miles, 20-in., proposed, Cameron County to Armstrong County, Pennsylvania.

58 miles, 14 and 20-in., planned, New York State line.

Sabinsville to Boom station.

Skaneateles to Onondaga, N. Y.

Ithaca to Dryden, N. Y.

Niagara Mohawk Power Corp.—55 miles, 10-in., under way. Watertown to Syracuse, New York. Williams-Austin Co. 8-1-53.

• **Northern Indiana Fuel & Light Co.**—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—580 miles, under way, Kansas, Texas, Oklahoma, and Nebraska loops.

Northern Natural Gas Co.—Section No. 1, 92 miles, 30-in., under way, Dumas via Sunray to main line north of Canadian River, Texas, and two loops near Beaver station, Oklahoma, R. H. Fulton & Co.

Northern Natural Gas Co.—Section 2, 70 miles, 30-in., contracted, loops near Mullinville, Bushton and Clifton stations, Kans., and Palmyra station, Neb. Lone Star Constructors.

Northern Natural Gas Co.—Section 3, 94 miles, 24-in. and 30-in., contracted loops near Paulina, Ogden, and Oakland stations, Iowa, G. G. Griffis Construction Co.

140 miles, 4-6-8-in., under way, south of Rolla, Kans., to Guymon, Okla. Reese Bros. Const. Co.

• **Northwest Natural Gas Co.**—750 miles, planned, Washington, Oregon, and Idaho.

24-in., Eastport, Idaho, to Monroe, Wash.

18-in., Monroe to International boundary near Lynden, Wash.

22-in., Monroe to near Seattle, Wash.

20-in., Seattle to Portland, Ore.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

• **Pacific Gas & Electric Co.**—50 miles, 12-16-20-in., planned, Fresno to Merced, Calif.

(Section 2) 20-in., Holm to Topock-Milpitas line.

(Section 3) 12-in., parallel existing Madera-Livingston line, planned. Napa Wye to Shellville; Cotati to Santa Rosa, Calif.

170 miles, 34-in., proposed, main-line loops along Topock, Ariz., to Milpitas, Calif.

Pacific Gas & Electric Co.—86 miles, 34-in., under way, parallel sections along Topock-Milpitas line. Engineers Pipe Line, Ltd. Summer 1953.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Permian Basin Pipeline Co. (Northern Natural)—280 miles, 16-24-26-30-in., under way, West Texas and New Mexico. R. H. Fulton & Co.

Phillips Petroleum Co.—28 miles, 10-in., under way, Bayou Plant to Adams Terminal. Massey Const. Co. Completion date 7-53.

• **Public Service Co. of Colorado**—34 miles, under way, Douglas Creek and other gas fields to Grand Junction, Colo., area. Foutz & Buraum Const. Co. 9-1-53.

• **Rockland Light & Power Co.**—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

• **Shenandoah Gas Co.**—39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

• **South Carolina Natural Gas Co.**—160 miles, 16-12-10-in., proposed, Aiken, S. C., to cities of Columbia, Summerville, and Charleston, S. C.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Ala., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee.

• **Southern California Gas Co., and Southern Counties Gas Co.**—73 miles, 30-in.,

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planned, loops on main line from Blythe to Los Angeles.

Southern Natural Gas Co.—1,235 miles, 24 to 4½-in., under way, Louisiana, Mississippi, Alabama, and Georgia, and South Carolina. Houston Contracting and H. C. Price. Fall 1953.

Gwinville, Miss., to Franklinton Junction, La. Houston Contr. 7-53.

Lateral from Franklinton Junction, La., to Sand Hook field, Mississippi. Houston Contracting.

Franklinton Junction, La., to Duck Lake gas field, Louisiana. Houston Contracting.

Duck Lake gas field, Louisiana, to Lake Sand field, Louisiana. Houston Contr.

• **Southwest Gas Corp., Ltd.**—26 miles, proposed, from P.G.& E. line to Victorville, Calif.

• **Tennessee Gas Transmission Co.**—574 miles, 30-in., proposed, Kinder, La., northeast through Louisiana, Mississippi, to Portland, Tenn.

130 miles, proposed, looping in Texas and Louisiana. Including 67 miles of 30-in. line.

63 miles, 26-in., proposed, loop near Greenup, Ky., and Mercer, Pa.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U. S.-Canadian border Hamburg station near St. Catherines.

Tennessee Gas Transmission Co.—Under way, 20 miles, 30-in., Natchitoches, La., to Goldonna, La. Oklahoma Contracting Co.

18 miles, 30-in., under way Middletown to Selmer, Tenn. Oklahoma Contracting Co.

35 miles, contracted, Campbellsville, Ky., to Danville, Ky. Western Pipe Line Constructors.

21 miles, 26-in., under way, Carter, Ky., to Ohio River. Western Pipe Line Constructors.

70 miles, 24-in., under way, Mercer, Pa., to Pigeon, near Coudersport, Pa. H. C. Price Co.

60 miles, 24-in., under way, Pigeon, Pa., to Hebron field, Porter County, Pennsylvania. Bechtel Corp.

Texas Eastern Transmission Corp.—315 miles, 24-in., under way, Provident City, Tex., to Castor, La. Brown & Root, Inc. 6-20-53.

Constructed, Lavaca County to Waller County, Texas. Associated Pipe Line Contractors, Inc.

Contracted, Polk County to Shelby County, Texas. Williams Brothers Co.

Contracted, River crossings of Trinity, Brazos, Colorado, and Saline rivers. Pentzien, Inc.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

• **United Fuel Gas Co.**—50 miles, 20-24-in., proposed, Wood County to Lanham, W. Va. Spring 1954.

32 miles, 24-in., proposed, near Ripley, W. Va., to Lanham station, Putnam County, W. Va.

• **United Gas Pipe Line Co.**—44 miles, 20-in., planned, Lirette field to Harvey, La.

• **United Natural Gas Co.**—50 miles, 12-in., planned, Elk County to Jefferson County, Pennsylvania.

• **Utah Natural Gas Co.**—103 miles, 16-18-in., proposed, Clear Creek field near Price to Salt Lake City, Utah.

18-in., Clear Creek to Provo, Utah.

16-in., Provo to Salt Lake City, Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Warren Petroleum Corp.—78 miles, 2-24-in., proposed, Lovington, N. M. Completion date 9-53.

Westcoast Transmission Co., Ltd.—(See foreign natural gas pipe lines).

• **Western Slope Gas Co.**—34 miles, 8-in., start June, Garmesa to West Douglas Creek, Colo. 8-53.

Foreign Crude-Oil Pipe Lines

Basrah Petroleum Co.—65 miles, 24-in., under way, Zubair to Fao, Iraq. Completion date 10-53.

• **Creole Petroleum Corp.**—25 miles, 34-in., planned, Lagunillas to La Salina (State of Zulia, Venezuela.)

Direccion General de Yacimientos Petroliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

• **Gaz de France,** 200 miles, 12-in. Ruhr to Paris, France.

Interprovincial Pipe Line Co.—135 miles, 24-in., under way, looping from Regina to U. S. border, Canada. Anderson International Contrs., Ltd. 8-53.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

Petroleos Mexicanos.—125 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

Texas Petroleum Co.—60 miles, 4-6-in., under way, Pta. Nino to La Dorada.

• **Trans Mountain Oil Pipe Line Co.**—30 miles, planned, Vancouver, B. C., terminal to Ferndale, Wash.

Trans Mountain Oil Pipeline Co.—711 miles, 24-in., under way, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers. Completion date 8-53.

Edmonton to Acheson, Canadian Pipe Line Const. 8-53.

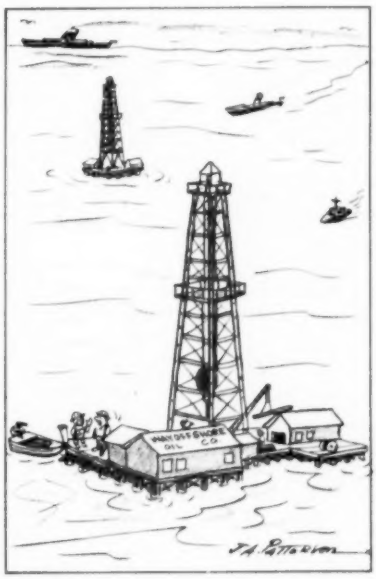
Jasper to Blue River, B. C., Comstock Midwestern. 8-53.

Blue River, B. C., to Coquehalla, B. C., Mannix, Ltd. 8-53.

Chilliwack to Coquehalla, B. C. Comstock Midwestern. 8-53.

Sumas to Vancouver, B. C., Comstock Midwestern 9-53.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.



"—and another thing, cut out that 'aye, aye, Sir'!"

Foreign Products Pipe Lines

Colombian Ministry of Petroleum.—115 miles, 4-in., begin 1953, La Dorada to Cartago, Colombia, Williams Bros. Engineers.

93 miles, 8-in., begin 1953, Cantimplora to Dorada, Colombia, William Bros. Constructors.

• **Empresa Nacional del Petroleo**—80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 6-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **Shell Co. of Australia.**—58 miles, 8-in., planned, Geelong, Melbourne to Newport, Australia.

Sun Pipe Line Co. of Canada.—200 miles, 8-in., under way, Sarnia, Hamilton, Toronto, Ont. Williams Bros. 10-53.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

Foreign Natural-Gas Pipe Lines

• **Azienda Generale Italiana Petroli.**—110 miles, 12-14-16-in., Start 11-52. Cortemaggiore to Genoa. Completion date 11-53.

Azienda Generale Italiana Petroli—90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

126 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direccion General del Gas del Estado—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo**—80 miles, 10-in., planned, Concon to Santiago, Chile.

• **Mid-Continent Pipelines, Ltd.**—1,860 miles, 30-in., proposed, Alberta to Montreal, Canada. Fish Engineering Co.

• **Northwest Natural Gas Co.**—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

• **Trans-Canada Pipe Lines, Ltd. (Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

• **Westcoast Transmission Co., Ltd.**—1,110 miles, 24-in., planned, Dawson Creek, B. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

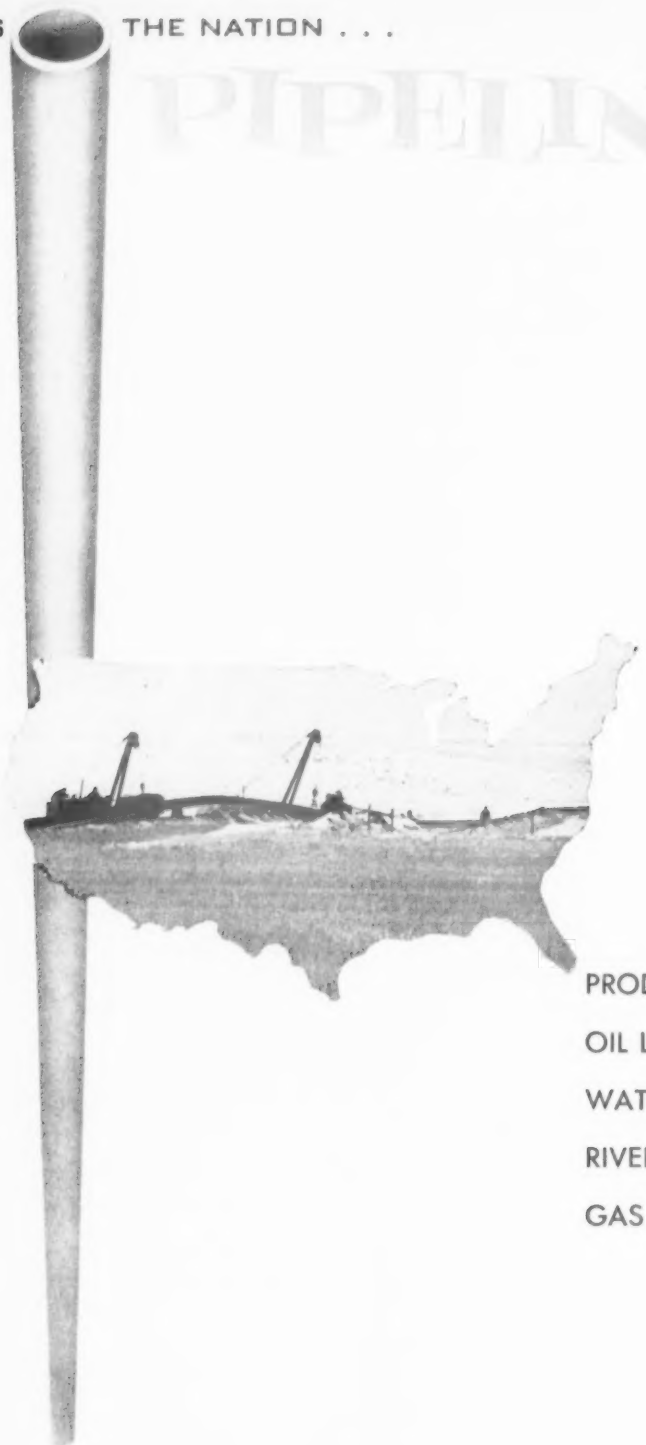
138 miles, 20-in., planned, Sumas to Tacoma, Wash.

139 miles, 18-in., planned, Tacoma, Wash., to Portland, Ore.

• **Western Pipe Lines.**—833 miles, 24-in., proposed, from southern Alberta, eastward across the Canadian prairies, serving principal towns and cities along the route.

ACROSS THE NATION . . .

PIPELINES



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PIPE LINES

Oil Lines Busy

First-quarter revenue and traffic over 1952 figures

WASHINGTON.—Traffic and revenues of the major oil pipe-line companies reporting to the Interstate Commerce Commission on their operations during the first quarter of 1953 were somewhat below those of the last quarter of 1952 but substantially above the first quarter of last year.

The commission's quarterly summary, covering operations of 56 companies with annual operating revenues in excess of $500,000, showed that the volume handled during the first quarter of 1952 but substantially end products compared with 892,175,646 bbl. in the preceding quarter and 829,664,162 bbl. in the corresponding 1952 period. Transportation revenue was $135,951,726 compared with $141,736,077 in the previous quarter and $129,162,362 in the same quarter last year.

Although the over-all totals increased in the first 3 months this year as compared with the initial 1952 quarter, 22 companies reported less traffic and 19 companies showed a decline in revenues. Reports of four companies—Freedom - Valvoline Oil Co., Illinois Pipe Line Co. of Texas, Nantucket Pipe Line Co., and West Texas Gulf Pipe Line Co.—were included in the ICC summary this year for the first time.

More than half of the traffic was handled by 10 systems, as follows:

Humble Pipe Line Co., 70,848,404 bbl. against 77,447,903 bbl. in the first quarter last year; Gulf Refining Co., 57,018,360 bbl. against 51,391,782 bbl.; Texas Pipe Line Co., 54,706,672 bbl. against 51,188,411 bbl.; Service Pipe Line Co., 48,531,260 bbl. against 45,159,571 bbl.; Buckeye Pipe Line Co., 48,091,869 bbl. against 49,536,753 bbl.; Interstate Oil Pipe Line Co., 47,027,161 bbl. against 46,467,162 bbl.; Magnolia Pipe Line Co. 42,521,176 bbl. against 43,222,095 bbl.; Sinclair Pipe Line Co., 42,195,119 bbl. against 44,190,779 bbl.; Ohio Oil Co., 42,015,360 bbl. against 36,642,686 bbl.; and Shell Pipe Line Corp., 37,232,862 bbl. against 38,565,442 bbl. With the exception of Ohio Oil Co., all showed slight declines from the last quarter of 1952.

Top companies in transportation revenue were Service Pipe Line Co., $14,096,324 against $14,318,313 in the first quarter last year; Humble Pipe Line Co., $9,902,386 against $10,708,174; Sinclair Pipe Line Co., $9,287,184 against $9,686,135; Great Lakes Pipe Line Co., $9,181,239 against $8,329,031; Texas Pipe Line Co. $8,925,637 against $8,344,194; Magnolia Pipe Line Co., $8,346,743 against $8,102,086; Shell Pipe Line Corp., $7,533,537 against $7,953,943; Gulf Refining Co., $7,286,643 against $7,768,124; Phillips Pipe Line Co., $5,845,128 against $4,176,809; Plantation Pipe Line Co., $5,598,674 against $4,672,649; and Interstate Oil Pipe Line Co., $5,464,559 against $5,298,891.

Two of the 10 companies with heaviest volume did not rank in the top revenue companies. They were Buckeye Pipe Line Co. (fifth) reporting revenue of $2,671,377 against $2,598,591, and Ohio Oil Co. (ninth) $4,061,956 against $3,544,470. Three of the companies with revenues in excess of $5,000,000 did not rank in volume. These included Great Lakes Pipe Line Co. (fourth) reporting 19,956,679 bbl. against 17,490,689 bbl.; Phillips Pipe Line Co. (ninth) 28,317,667 bbl. against 24,150,906 bbl.; and Plantation Pipe Line Co. (tenth) 17,778,369 bbl. against 15,333,450 bbl.

Work on Plantation Line Gets Under Way

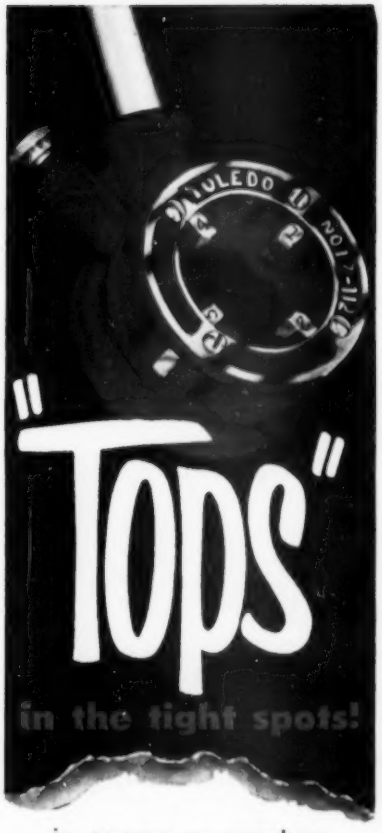
CHARLOTTE, N. C.—Anderson Brothers Corp. has begun clearing the right-of-way between Charlotte and Greensboro for Plantation Pipe Line Co.'s 82-mile line. Laying of the 14-in. pipe will take place the latter part of July.

Big Barge Movement of Line Pipe Near Completion

HOUSTON.—One of the largest single barge movements of line pipe is nearing completion.

Some 42,000 tons of 20-in. pipe has been shipped from here by A. O. Smith of Texas to Harvey, La. There the pipe is being picked up by Southern Natural Gas Co., Birmingham, for laying operations in Alabama and Mississippi. Accumulation of these lines will reach 211 miles.

The movement has involved the use of 95 barges each loaded at Greens Bayou here with approximately 500 tons of pipe. The barges were towed through the Houston ship channel and



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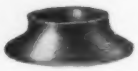

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Backers of Proposed Big Gas System Add to Board

HOUSTON.—Texas Gas & Oil Co. officials have announced the appointment of four new directors who will enter the company's venture to construct a $300,000,000 natural-gas transmission system from the Rio Grande Valley and Gulf Coast areas to northern and eastern markets.

The new appointments are L. A. Cage, Taft, Tex., banker-oilman; H. C. Cockburn, Cockburn Oil Co.; Glenn McCarthy, Houston oilman; and Charles M. Rogers, gas expert with New Orleans Public Service, Inc.

The firm plans to build two 30-in. lines, each with a capacity of 450,000,000 cu. ft., plus coastal gathering systems *(The Oil and Gas Journal, March 2, page 37)*. One proposed line will start in the Rio Grande Valley and the other in the Louisiana coastal section. The lines would meet in northern Mississippi and run parallel to a point in Iowa. There they would branch out with one running north, the other into Pennsylvania and New York.

The system is planned to supply natural gas to St. Louis, Chicago, Detroit, Cleveland, and Philadelphia. So far, the company has not made public data on reserves or financing. J. O. Mack, president of the firm, said this information will be contained in the company's application to the Federal Power Commission.

FPC Recesses Northwest Line Hearing Until July

WASHINGTON.—A Federal Power Commission hearing on applications to lay natural-gas pipe lines into the Pacific Northwest has been recessed until July 22.

At that time competing applicants will present market testimony followed by cross examination of witnesses.

Actively competing applicants include Westcoast Transmission Co., which plans to pipe the gas from northern Alberta and British Columbia to the Northwest; Trans-Northwest Gas Co., which would pipe Westcoast gas into the Washington-Idaho area; and Pacific Northwest Pipe Line Co., which seeks permission to supply the sector with gas from the San Juan basin.

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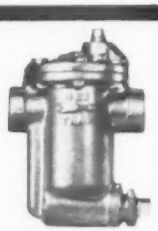

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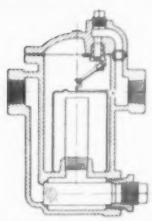

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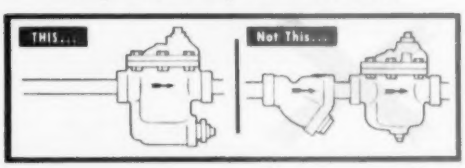

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Among the Drilling Contractors

Bass Drilling Co.
Houston

BASS DRILLING CO., one of the more active smaller drilling contracting companies on the Texas Gulf Coast, was organized in 1948. Executive and operating headquarters are in the San Jacinto Building, Houston.

E. L. BASS

Personnel . . . E. L. Bass, organizer and long known in Texas drilling circles, is principal owner and president. H. G. Bass is drilling supervisor. Tool pushers are A. C. Capps, R. A. Campbell, and P. Z. Stevens.

Operations . . . Activities of the company have been directed almost exclusively to contracting, primarily on the Gulf Coast. Current drilling is in the Texas portion of the coastal region.

Equipment . . . The company operates three mechanical-power rotary rigs, including two medium-large assemblies, and one lighter rig. Each of the medium-large rigs is powered by three 225-hp. engines, uses two mud pumps (one 7¾ by 16-in., and the other 7¼ by 10-in.), and has a 129-ft., 563,000-lb.-capacity derrick, mounted on a 10-ft. substructure. One now is working in the Big Hill field, in Jefferson County, for E. J. Hudson, and the other in the A. R. Connell field, Harris County, for F. A. Callery, Inc. The lighter rig, under contract to Stanolind Oil & Gas Co. in the Petronilla field, Nueces County, has one 213-hp. engine, and one 7¼ by 12-in. pump, and uses a 94-ft. derrick on a 13-ft. substructure.

Performance . . . The three rigs drilled a total of 151,745 ft. of hole during 1952, of which 112,638 ft. was cut by the larger two rigs, and 39,107 ft. by the smaller assembly.

Glasscock Drilling Co., Shreveport, is drilling for H. L. Hunt at a new wildcat location in the Black Hawk area of southern Concordia Parish, eastern Louisiana. The test, 1 Learned, 1¾ miles south of Shaw, is projected to 9,000 ft., which should put it through the Wilcox section. Location is in 27-2n-8e.

Crescent Drilling Co., Monroe, La., has a new 10,500-ft. operation under way in the East Haynesville field, in Claiborne Parish, North Louisiana.

C. C. Nelson (extreme right), and A. H. Parks (second from right), partners in the Mallard Drilling Co., one of Kansas' most active contracting and operating firms, on one of their frequent visits to the field. With them, on one of their rigs operating in the Hunter field, in southeastern Saline County, are, left to right: H. J. (Jerry) Plouffe, tool pusher; Pat Plouffe, driller; G. H. Elmore and R. F. Lickey, floormen; and E. J. Heape, derrickman.

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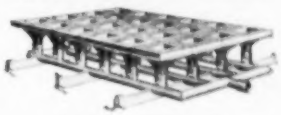

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WHERE THERE'S MONEY THERE'S 'BESTOLIFE

The well, 1 Burnham-Gipson, in 34-23n-7w, is being drilled for Crescent Production Co., its affiliate, and Group Oil Co.

Whitehurst Drilling Co., El Dorado, Ark., has moved in a rotary rig for a 5,600-ft. Wilcox test it has contracted to drill for Kirby Petroleum Co., of Houston, at a wildcat location 1½ miles southeast of Galbraith, in Natchitoches Parish, Louisiana. Location is for 2 Bentley, in the C SE SW 29-6n-4w.

Penrod Drilling Co., Shreveport, has a new 12,000-ft. operation under way in Evangeline Parish, Coastal Louisiana, where it is drilling for Lamar Hunt trust estate of Dallas. It is a wildcat, 1 Deville, located about 5 miles southwest of the Villa Platte field in the C SW SW 25-4s-2e.

Crescent Drilling Co., Monroe, La., is drilling a deep test for Heep Oil Corp. and associates on Harpers Island in the Rodney Bend of the Mississippi River, 4½ miles southeast of Locust Ridge, Tensas Parish, Louisiana. Rig was moved in by barge from a specially built landing on the Mississippi side of the river. The test, 1 Magnolia-Learned, is projected to the Tuscaloosa, expected at 9,200 to 9,500 ft.

B. B. Drilling Co. has contracted with B.K.S. Oil Co. for a wildcat test to be drilled near the Earlimart townsite, in Tulare County, California. Location is in 32-23s-24e.

Rebstock & Reeves, contracting for Robert W. O'Meara, will drill a 10,500-ft. test at a half-mile stepout location on the north side of the Leesville Dome, in Lafourche Parish, coastal Louisiana. Location is for 1 Tilmore-Lee heirs, in 15-21s-22e.

ACTIVE ROTARY RIGS*

Area—	Week ended 6-22-53	Change week ended 6-15-53	Change week ended 6-23-52
Gulf Coast	600	— 1	— 14
N. & W. Tex.-N. M.	821	— 8	—122
Ark.-N. La.-E. Tex.	150	+ 9	+ 10
Oklahoma	326	—12	0
Kansas-S. Nebraska	166	— 8	+ 4
Illinois-Eastern	151	+12	— 21
Rocky Mtn.	263	+ 9	+ 19
Pacific Coast	173	— 2	+ 5
Total U. S.	2,650	— 1	—137
Western Canada	195	+ 4	+ 23
Total	2,845	+ 3	—114

*Courtesy Hughes Tool Co. Trend in drilling activity in the United States, North and West Texas-New Mexico, and Oklahoma-Kansas are shown on pages 159 and 160.

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PAULSBORO, NEW JERSEY

Fluor played a prominent role in the expansion program now being completed at Socony-Vacuum's Paulsboro refinery, one of the largest on the East Coast. Fluor's "turn-key contract" called for the engineering and erection of the 15,000 B/D Thermofor Cat-Cracker – similar to the one Fluor built for Socony at Augusta, Kansas, two years ago – plus the feed preparation system, fractionation units, gasoline plant, piping and many of the offsite facilities – all on schedule and within the budget. Fluor's ability to design, engineer and build complete plants and facilities for the petroleum, gas, chemical, power and heavy industries has been ably demonstrated on many previous occasions.

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REFINING

Proposed East Coast Refinery Gets Certificate of Necessity

NEW YORK.—Pan American Refining Corp. has been issued a certificate of necessity for construction of a 25,000 bbl. per day refinery on the Delaware River near Pedricktown, N. J.

Even though the certificate specifies the New Jersey building site, the company has two other possible locations under consideration. One near Portsmouth, R. I., on Narragansett Bay at the north end of Aquidneck Island, and the other in Talbot County, Maryland, on the east shore of Chesepeake Bay about 25 miles southeast of Baltimore *(The Oil and Gas Journal, May 11, page 84)*.

Company officials report that a definite decision on a building site will not be announced until studies on all the proposed sites have been completed. Primarily, Pan American is seeking a site which can be easily reached by ocean-going vessels.

Indiana Standard Operating New Research Lab at Whiting

WHITING, Ind.—Standard Oil Co. (Ind.) has added a new dynamometer laboratory to its research center here to aid in the company's program for developing new and improved automotive fuels and lubricants.

Located in a new building adjacent to the company's automotive laboratory, the dynamometer lab has 16 engine test stands each equipped with dynamometer and other modern control and measuring instruments. Each stand is mounted on 3 tons of concrete to eliminate cross vibration.

The new section adds 15,000 sq. ft. of floor space to Standard's fuels and lubricants laboratory, which has been in operation since 1925.

Military Alkylation Contract Awarded Cosden Petroleum

WASHINGTON. — Cosden Petroleum Corp., Big Spring, Tex., has accepted an alkylation facility and supply contract under the military alkylation expansion program, it was announced last week by the Armed Services Petroleum Purchasing Agency.

The contract, negotiated by ASPPA and the Petroleum Administration for Defense, will cover the construction of facilities to add approximately 2,300 bbl. daily of 115/145-grade aviation gasoline to current production.

ASPPA officials also announced that contracts have been negotiated for well over 200,000,000 gal. of aviation gasoline, 2,750,000 bbl. of Navy special fuel oil, and 70,000 bbl. of marine diesel oil for delivery during the first half of the coming fiscal year.

Contracts for aviation gasoline were placed with Standard Oil Co. of California for 29,075,600 gal. of grade 115/145; Sinclair Refining Co., 134,800,000 gal. of various grades; Richfield Oil Corp., 27,300,000 gal. of grade 115/145; Union Oil Co. of California, 18,933,600 gal. of grade 115/145 and 1,200,000 bbl. of grade 80/86; and

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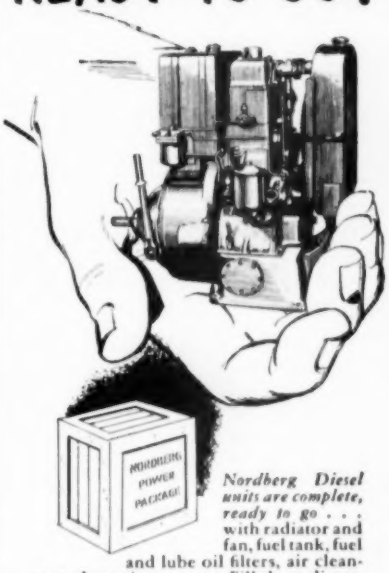

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Tide Water Associated Oil Co., 300,000 bbl. of grade 80/86.

Union also will furnish 2,000,000 bbl. of Navy special and The Texas Co. will supply 750,000 bbl. The contract for diesel oil was placed with the Mohawk Petroleum Co.

C. R. A. Refinery Revamped

PHILLIPSBURG, Kans. — Enlargement and modernization of Cooperative Refinery Association's plant here has been completed.

The revamping program has doubled the refinery's crude-charging capacity from the former 4,000 bbl. daily to 8,000 bbl. per day. In turn vacuum distillation, cat cracking, polymerization, and asphalt capacities were increased.

The entire project, which included construction of a pipe line from the refinery to Holdrege, Neb., cost an estimated $3,500,000. Refinery Engineering Co., Tulsa, was construction contractor on the refinery program.

N.C.R.A. Adding Coking Unit At McPherson, Kans., Plant

McPHERSON, Kans. — A coking unit at National Cooperative Refinery Association's refinery here is under construction with plans calling for the unit to be in operation by October 1.

The unit, which will have a capacity output of 200 tons of coke daily, is being built by Chicago Bridge & Iron Co. The unit's entire production of coke will be marketed by Great Lakes Carbon Corp.

The McPherson refinery has a crude-charge capacity of 26,500 bbl. daily. Thermal operations total 12,500 bbl. daily, vacuum distillation 5,000 bbl. daily, and cat cracking 10,500 bbl. daily. Polymerization capacity is expected to be increased by 200 bbl. daily to total 900 bbl. per day.

Refining Briefs

DRUMRIGHT, Okla.—A crude-topping unit, with a capacity of 15,000 bbl. per day and a vacuum unit, with a 6,000-bbl.-daily capacity, are being completed at Tide Water Associated Oil Co.'s refinery here.

LOS ANGELES. — Negotiations on contract amendments and revisions between Oil Workers International Union's Local 445 at Avon refinery, San Francisco, and Tide Water Associated Oil Co. have been recessed. Also, a recess has been called in the union's negotiations concerning the same issues with Continental Oil Co. on the West Coast.

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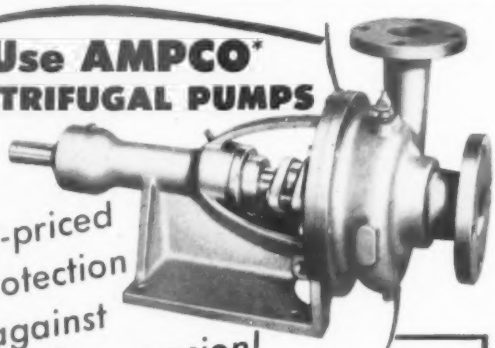

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These money-saving units are fabricated throughout of the proper combination of Ampco aluminum bronzes. That's why they have exceptional resistance to corrosion, as well as deformation, cavitation erosion, and wear from abrasive solids in suspension.

You find Ampco Pumps performing dependably and efficiently wherever there's a tough pumping job. They handle hot sulfuric acid, hydrofluoric acid, fatty acids, dyestuffs, caustics, polluted harbor water, and most other corrosive liquids. Available in sizes from fractional flow to 600 gpm — pedestal or close-coupled mounting. Write for more information today. *Reg. U. S. Pat. Off.

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NATURAL GAS

Olin Purchases Control Of Interstate Natural

NEW YORK.—Olin Industries, Inc., has obtained control of Interstate Natural Gas Co. of Monroe, La., in a $42,000,000 stock transaction. Olin has purchased 54 per cent of Interstate stock from Standard Oil Co. (N. J.), 5 per cent from American Republics Corp., and 15 per cent from Columbian Carbon Co. Added to 7 per cent interest acquired through its purchase of Frost Lumber Industries, Inc., last year, Olin now owns 770,000 shares of Interstate or approximately 81 per cent of the 953,000 shares outstanding.

John M. Olin, president, said that his company bought controlling interest in Interstate to begin an aggressive exploration and development program on Interstate's natural-gas properties in East Texas, Arkansas, and Louisiana.

Interstate produces and transports natural gas from Monroe gas fields to Baton Rouge refineries over its 870 miles of pipe line. The company owns substantial gas reserves in the Monroe field and controls large reserves through contracts with various producers.

20 Billion Cubic Feet of Gas Being Stored in One Cavity

HERSCHER, Ill. — Approximately 20,000,000,000 cu. ft. of natural gas will be stored in a single underground cavity near here by end of the year, according to Max W. Ball, Washington, D. C., oil and gas consultant.

The gas is being stored in water sands of a 1,750-ft. reservoir which has an estimated capacity of 90,000,000,000 cu. ft. *(The Oil and Gas Journal, January 28, 1952, page 404.)*

The Herscher dome project was started last fall by three Peoples Gas Light & Coke Co. subsidiaries, Natural Gas Storage Co. of Illinois, Natural Gas Pipeline Co. of America, and Texas Illinois Natural Gas Pipeline Co. During this first phase of operations some $17,000,000 has been spent for drilling 25 wells, laying 17 miles of 30-in. pipe from the dome to Texas Illinois' line to carry gas to storage, building a 10,000-hp. compressor station and a dehydration plant, and purchasing other needed equipment *(The Oil and Gas Journal, September 22, 1952, page 165)*.

Eventually the entire program will cost about $50,000,000. Next year another 30-in. line will be laid with two more planned within 5 years.

Ball predicts the project may set a pattern for the industry's seasonal problem of storing gas when heating demands fall off.

Texas Gas Sales Up

AUSTIN.—Texas Railroad Commission reports that during 1952 the state sold 4.3 trillion cubic feet of gas from over 5 trillion cubic feet produced.

These sales represent a 12 per cent increase over the preceding year. Transmission lines purchased 3.2 trillion cubic feet, which is an increase of 14 per cent over 1951.

Of the total gas production, a trillion cubic feet went back into the ground for pressure maintenance and repressuring operations. Operators have flared about 1 billion cubic feet per month.

Compromise Offer Rejected

WASHINGTON.—The Federal Power Commission has refused a compromise offer in a hearing on Transcontinental Gas Pipe Line Corp.'s request for a $9,819,000 yearly natural-gas rate increase.

The compromise proposal was submitted by seven gas firms supplied wholesale by Transcontinental, which objected to the proposal. Also, 11 other Transcontinental customers were not in favor of the motion, which would have increased Trancontinental's revenue by $6,000,000.

FPC ruled that any compromise negotiations should be carried on by Transcontinental and its wholesale consumers without direction from the commission.

Natural Gasoline

Fast Tax Write-Off Approved For New Tioga, N. D., Plant

WASHINGTON.—Signal Oil & Gas Co. has been granted a quick tax write-off by the Office of Defense Mobilization for construction of a natural-gasoline plant at Tioga, N. D.

Signal will be permitted to write off 65 per cent of $6,318,500 and 40 per cent of $3,250,000 of the $9,500,000 investment.

When the plant is completed in the autumn of 1954, it will process, at capacity, 40,000,000 cu. ft. daily of wet gas from Beaver Lodge and Tioga oil fields. Output is expected to be 150,000 gal. of natural-gasoline and L.P.G. and about 40 tons of sulfur *(The Oil and Gas Journal, March 16, page 82)*.

Signal will build and operate the plant under an agreement with Amerada Petroleum Corp., which originally planned the plant. Amerada will retain title to the gas and sell the residue. Signal will market the liquid products and sulfur with Amerada sharing in the proceeds.

Sunray to Increase Propane Recovery at Snyder Plant

SNYDER, Tex.—Sunray Oil Corp. has revealed that it will install additional processing facilities to increase propane recovery at its natural-gasoline plant here.

Processing 75,000,000 cu. ft. per day of natural gas, the plant will increase propane recovery to 76 per cent with an additional absorber and other equipment. At this rate estimates indicate the plant will produce 100,000 gal. daily of propane. It was originally designed to handle 50,000,000 cu. ft. of gas per day with 70 per cent propane recovery.

New Plant in Glen Cove Field to Go on Stream Soon

AUSTIN.—Operators in Glen Cove field, Coleman County, Texas, are planning to put in operation a gasoline plant which will aid in conserving gas now being flared in the field.

The plant, which will cost approximately $500,000, will have a capacity of 5,000,000 cu. ft. daily. The residue gas will be sold to Lone Star Gas Co.

Luling Oil & Gas Co., W. C. Wolf, and N. H. Wheless, who plan to operate the plant, asked the Texas Railroad Commission at a recent hearing here to give them until July 15 to August 1 to get it into operation. The operators were summoned to appear at the hearing and show cause why the field should not be shut in for gas waste.

Cycling Plant Approved

SWEETWATER, Tex. — Rowan & Hope has obtained permission of the Civil Aeronautics Administration to construct a cycling plant on city airport property here.

The plant, which will be built on the northwest corner of the airport, will process from 3,000,000 to 5,000,000 cu. ft. daily of wet gas from Rowan & Hope oil field located west of the building site *(The Oil and Gas Journal, June 1, 1953, page 132)*. It will produce gasoline, butane, and propane.

The company expects to complete construction of the plant by October.

"That fellow wasn't just talking!"

"Going over the well records here reminds me of the time I finally got to talking packers with the Lane-Wells man.

"I'll admit, I was a little skeptical to begin -- you naturally expect a man to be high on his own products -- but, doggone it, that fellow had a real story. He pointed out things in the design and construction of his packers that showed they'd been built by men who really knew oil country needs. Every question I asked, he had an answer that added up just right.

"Well, to end up, I said I'd try 'em. I've been using 'em quite a while now, and these records prove it --

"...Those Lane-Wells Packers are giving us better service!"

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AP-605

EXPLORATION

Green River Basin Interest Heightens

by Philip C. Ingalls

ENTHUSIASM for the gas potentialities of Southwest Wyoming's Green River basin is reaching a high pitch. Lease blocks have been assembled, structures have been shot out, and an increase in wildcat drilling is scheduled for this summer.

The Green River basin, despite rather limited positive indications of its potentialities, is being played heavily with the thought that here is a coming rival of the San Juan basin, where tremendous reserves of gas are being developed in a Cretaceous section not unlike that found in the big Wyoming basin.

This basin lies between the Wyoming-Idaho-Utah overthrust belt on the west and the Rawlins and Sierra Madre uplifts on the east; the Wind River range on the north and the Uinta Mountains on the south. Developed production in the Green River basin is currently limited to:

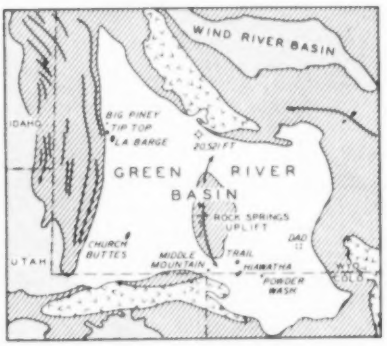
1. LaBarge field, where oil and gas are found in Eocene and Upper Cretaceous sands at depth of less than 1,000 ft. on a complexly faulted anticline. (About 10 miles to the west of this field, Mountain Fuel Supply Co. is preparing to drill an untested structure.)

2. Big Piney-Tip Top area, where prolific shallow Eocene gas wells are being developed. About 2 years ago General Petroleum Co. completed a Jurassic-Nugget well at 9,800 ft. flowing 266 bbl. of 60°-gravity oil daily. Two subsequent deep tests were dry, but a third test has been completed recently pumping 450 bbl. of oil daily. (Continental Oil Co. is drilling a Mesaverde test in this area and Mountain Fuel is expected to start a deep wildcat in the near future.)

3. Church Buttes, where gas distillate is produced from the Cretaceous-Dakota at 12,500 ft. and deeper.

4. Rock Springs uplift, where Baxter Basin fields produce gas from Mesozoic rocks ranging in age from Cretaceous-Frontier to Jurassic-Nugget at depths of 1,800 to 4,000 ft.

5. Middle Mountain, where last fall Stanolind Oil & Gas Co. completed a wildcat in the Cretaceous-Mesaverde at 6,500 ft. for 169 bbl. of oil daily.



Setting of Green River basin.

(Stanolind is now drilling a confirmation test about ½ mile southwest of the discovery.)

6. Trail, where, shortly after the Middle Mountain discovery, Mountain Fuel completed a Mesaverde sand well for 4,260 M.c.f. gas daily at 7,350 ft. (It was this discovery, coupled with that at Middle Mountain, that sparked optimistic thinking about the theretofore neglected Mesaverde sandstones in the Green River basin.)

7. The Wyoming-Colorado line, where oil and gas have been produced from lenticular lower Eocene strata at Hiawatha and Powder Wash fields for many years. During 1952, Mountain Fuel brought new life to this area by completing an 11-M.M.c.f. gas well at Hiawatha from the Upper Cretaceous-Lance at 4,900 ft. (Mountain Fuel is currently drilling an 8,000-ft. Mesaverde test about 5 miles southwest of Hiawatha field and continuing its deeper-pool testing at Powder Wash which yielded a Paleocene-Fort Union discovery last year.)

In August 1952 a wildcat in the Dad area recovered 4,500 ft. of 48°-gravity oil on a drill-stem test of the Pennsylvanian-Tensleep at 10,250 ft., but completion tests produced water and the well was completed dry.

Pre-Tertiary rocks in the Green River basin are found at depths of 5,000 ft. or more except on the broad flanks of the Rock Springs uplift and at the northern, eastern, and southern margins of the basin. (In the north-central portion of the basin, Superior Oil Co. drilled a well to 20,521 ft. and, though only 10 miles from exposed pre-Cambrian granite, was still in Upper Cretaceous rocks at total depth.) There are sizable areas within this province, however, where proved oil and gas-bearing rocks of Tertiary and Upper Cretaceous age can be tapped at moderate depths. The next few months can be expected to see some exciting developments.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS . . . Phillips Petroleum Co. completed another well in Glenna pool and set a producing depth record for the West Texas area. No. 1-E Puckett became the third completion in the pool. Potential of 37,500,000 cu. ft. was registered from the Ellenburger at 14,550-14,700 and 14,910-15,000 ft. Phillips' 1 Glenna, discovery well, produced from intervals to 14,522 ft.

KANSAS . . . A new gas discovery is reported in southwestern Kansas at United Producing Co. 1 Harper, C NW SE 9-34s-21w, 2½ miles north of Snake Creek gas pool in Clark County. Gas volume was gaged at 8,000 M.c.f. per day from perforations at 5,437-69 ft. in the Morrow sand. The new strike is located in the highly active Hugoton embayment.

OKLAHOMA . . . A Springer sand gas discovery has been completed by Huffman & Malloy at 1 Sophia Hanza, NW SW SE 33-8n-16w, Washita County, western Oklahoma. The well flowed 2,730 M.c.f. of gas per day from perforations at 5,740-52, 5,994-6,034, and 6,050-6,106 ft., and 2,170 M.c.f. of gas from 5,696-5,710 and 5,740-52 ft.

Wildcat Completions, May 1953

	Total	Oil	Gas	Dry	Footage	1953 Total comp.	1953 Cum. (1,000 ft.)	1952 Total comp.	1952 Cum. (1,000 ft.)
Kansas	99	12	7	80	377,372	388	1,446	370	1,429
Oklahoma	91	19	6	66	395,727	327	1,455	326	1,566
Texas	505	80	21	404	2,349,537	2,206	10,497	2,032	9,704
North Central	209	39	1	169	715,608	911	3,203	909	3,064
West	91	21	1	69	497,555	352	2,031	342	1,985
Panhandle	2	0	0	2	15,383	13	67	24	158
East	36	4	2	30	193,389	130	645	96	558
Gulf Coast	73	8	8	57	495,861	360	2,628	311	2,350
Southwest	94	8	9	77	431,741	440	1,923	350	1,589
Louisiana	45	8	4	33	389,036	188	1,653	136	1,192
North	14	0	3	11	68,310	56	310	58	329
South	31	8	1	22	320,726	132	1,343	78	863
Mississippi	12	1	0	11	79,661	78	569	74	550
Arkansas	2	0	0	2	9,056	39	161	30	134
Nebraska	15	1	1	13	79,876	64	331	54	217
Rocky Mountains	50	8	3	39	300,464	229	1,318	161	890
Dakotas	10	3	0	7	65,984	26	150	10	79
New Mexico	13	1	2	10	76,096	68	435	65	432
California	56	3	1	52	248,088	265	1,205	239	1,123
Tri-States	96	14	1	81	197,129	358	714	486	987
Others	39	0	3	36	132,617	187	648	201	603
Total May 1953	1,033	*150	49	834	4,700,643	4,423	20,582	4,184	18,906
Total April 1953	806	117	32	657	3,741,752	.....	.....	.....	.....
Cumulative 1953	4,423	638	163	3,622	20,581,665	4,423	20,582	.....	.....
Cumulative 1952	4,184	667	110	3,407	18,905,504	.....	.....	4,184	18,906

*Incl. 10 condensate wells: E. Texas 3, Texas Gulf 2, S. W. Texas 2, S. Louisiana 3.

May Wildcat Completions Hit New High

by John C. McCaslin

MAY wildcat completions in the United States hit a new high for any one month, rising more than 28 per cent over April to a total of 1,033.

Cumulative wildcat completions for the first 5 months of 1953 show a 5 per cent gain over the previous year. New oil discoveries are slightly down from last year, but new gas strikes and dry holes drilled show a marked gain. Wildcatters have dug more than 20,000,000 ft. of hole this year. Wildcat completions are up in all areas except the Illinois basin. Exploratory drilling in the Rocky Mountain states is up 42 per cent over last year, while in the Dakotas wildcat completions are up more than 100 per cent. In West Texas, where total wells drilled are behind last year's figures, wildcat completions show a slight gain.

Green River basin . . . An intensive wildcat program is in prospect for the Green River basin of Wyoming this summer. Interest in the Mesaverde possibilities of the basin has sparked the exploratory campaign. Stanolind Oil & Gas Co. opened Mesaverde oil production in the basin last year at Middle Mountain in Sweetwater County, and that company is now drilling a confirmation to the discovery which produced 169 bbl. of oil per day on completion. Mountain Fuel Supply Co. opened Mesaverde gas production in the basin at Trail Unit northeast of Middle Mountain in 1952. Wildcats are slated for the Big Piney area of Sublette County and on the Deadline Ridge structure, about 10 miles west of LaBarge field, furthering exploration of this portion of the basin.

Denver-Julesburg basin . . . The Denver-Julesburg basin area of Colorado and western Nebraska continues to be the most active and successful wildcat territory in the Rocky Mountains. As of the first of June operators had successfully completed 21 oil or gas discoveries. Ten other strikes have not been officially completed, but are apparently commercial on the basis of tests. The most significant discovery in the basin was the Lyons sand (Permian) strike in Keota field, promising further search for pre-Cretaceous production in the area in the immediate future. Greenhorn production has been confirmed in the basin, also.

Mississippi . . . Maxie field, Forrest County, appears to be one of the best discoveries in the state in the past 2 years. The field was opened by Ohio Oil Co. with gas-condensate production from the Eutaw, and confirmed by its second well. Ohio recently extended the field 1½ miles southwest with a well producing gas-condensate from the lower Tuscaloosa. This well had good showings in the discovery well's Eutaw pay, as well as in the shallower Wilcox and Chalk horizons. Tuscaloosa production is being confirmed by The Texas Co. at its south offset to Ohio's original Eutaw discovery well.

West Texas . . . The month's developments in West Texas gave the area its deepest well at Gulf Oil Corp. 1 Northrup, Delaware basin wildcat southeast of Pecos in Reeves County. Total depth was 16,696 ft., dry, and still in the Pennsylvanian.

A general decline in drilling activity has continued since the Spraberry shutdown, but deep exploration has been pinched very little, if any. Phillips Petroleum Co. added another gas-distillate well to its Glenna pool in Pecos County, and announced locations for additional deep holes in the area.

In northeast Ector County, Headlee-Ellenburger field gained a confirmation well. Offset development drilling, plus the magnitude of the pay section promise a field of major proportions.

May Completions Set New Record

by John C. McCaslin

TOTAL completions in the United States in May set a new record for any one month, and for the first time this year cumulative completions are slightly higher than 1952 totals. May completions showed an 18 per cent gain over the previous month with all well classifications showing marked gains. While cumulative totals are just slightly higher than last year's figures, footage is still lagging behind 1952. Cumulative gas-well completions show a slight gain over 1952, dry holes are up, while total oil-wells drilled are down.

The shutdown of operations in West Texas' Spraberry Trend is reflected in the cumulative totals of depth classifications for the first 5 months of 1953 as well as in the number of wells finaled in West Texas. A considerable decline in the number of wells drilled in the 5,000-7,500-ft. class is the result of this West Texas cutback. The deepest classification (over 12,500 ft.) and the 2,500-5,000-ft. class are the only columns showing a gain over last year.

Oklahoma and Kansas are enjoying a record year in the number of wells completed. May totals in those states were at record highs. Increased drilling activity is reported in the central counties of Oklahoma in the older areas and especially in Kendrick and East Payson pools. Field development and wildcatting is particularly high on the Central Kansas uplift and its flanks this year. Total wells completed in Texas showed a healthy gain over the previous month. Completions in West Texas, where drilling has been lagging this year, show a significant gain over the previous month, but still lag far behind last year's figures. North Dakota completions jumped more than 100 per cent in May, while the Rocky Mountain region continued its high level of activity.

Spring brought a new high in drilling in the Denver-Julesburg basin. Both pool and wildcat tests show a steady increase, particularly in the general eastern Adams County, Colorado area, where a number of new tests are under way in Little Beaver and Badger Creek pools. Crude-oil production in Colorado, boosted considerably by recent significant Denver basin discoveries and subsequent development, reached a high of 100,000 bbl. daily.

SUMMARY OF COMPLETIONS, MAY 1953

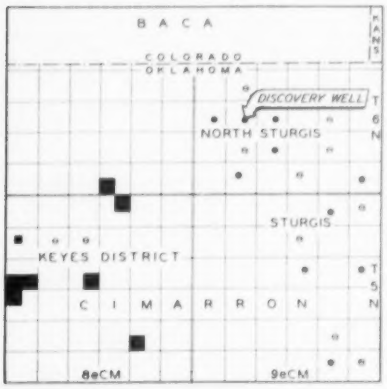
	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	65	35	0	30	65	0	0	0	0	0	96,000	54
Pennsylvania	165	80	20	65	140	15	10	0	0	0	310,500	155
West Virginia	52	3	42	7	23	23	6	0	0	0	160,967	188
Maryland	0	0	0	0	0	0	0	0	0	0	0	5
Ohio	96	45	12	39	46	50	0	0	0	0	211,426	170
Kentucky	110	34	20	56	72	38	0	0	0	0	228,180	159
Illinois	169	70	0	99	83	86	0	0	0	0	396,407	316
Indiana	120	49	5	66	106	14	0	0	0	0	201,159	149
Michigan	45	12	0	33	23	18	4	0	0	0	124,420	115
Kansas	542	249	51	242	55	483	4	0	0	0	1,838,579	403
Nebraska	34	14	2	18	0	19	15	0	0	0	175,243	35
Oklahoma	710	404	41	265	230	381	76	17	5	1	2,427,281	593
Texas	1,686	963	98	625	367	656	466	160	29	8	7,591,812	1,152
N. Central (Dist. 7-B & 9)	661	378	4	279	239	287	133	1	0	1	2,230,735	319
West (Dist. 7-C & 8)	401	304	1	96	44	150	148	39	14	6	2,099,227	313
Panhandle (Dist. 10)	67	28	33	6	5	61	0	0	1	0	208,772	69
East (Dist. 5 & 6)	92	42	7	43	8	40	33	10	1	0	466,855	81
Gulf Coast (Dist. 2 & 3)	216	92	25	99	24	41	71	70	9	1	1,342,260	205
Southwest (Dist. 1 & 4)	249	119	28	102	47	77	81	40	4	0	1,243,963	165
Louisiana	202	105	19	78	37	40	22	43	41	19	1,418,956	296
North	88	38	12	38	37	27	18	3	3	0	301,617	113
South	114	67	7	40	0	13	4	40	38	19	1,117,339	183
Arkansas	39	22	0	17	6	20	12	1	0	0	148,705	36
Mississippi	26	6	1	19	1	2	21	2	0	0	159,537	35
Ala.-Ga.-Fla.	9	0	0	9	0	2	7	0	0	0	48,217	19
Montana	37	21	2	14	13	14	5	5	0	0	164,593	69
Wyoming	54	35	3	16	8	16	26	3	1	0	269,243	165
Colorado	48	16	12	20	1	20	24	3	0	0	238,021	65
Utah	7	2	0	5	1	0	2	2	2	0	50,301	19
New Mexico	136	54	65	17	29	36	39	17	11	4	740,776	190
California	225	160	5	60	59	87	46	17	14	2	1,012,097	273
North Dakota	34	25	0	9	0	4	2	25	3	0	272,531	35
Miscellaneous	§2	0	0	2	0	1	1	0	0	0	8,300	¶7
Total May 1953	4,613	†2,404	398	*1,811	1,365	2,025	788	295	106	34	18,293,251	‡4,703
Total April 1953	3,896	2,059	314	1,523	1,179	1,613	659	276	119	50	15,933,978	4,793
Cumulative 1953	19,492	10,055	1,550	7,887	5,777	8,156	3,390	1,435	562	172	79,300,739	
Cumulative 1952	19,414	10,445	1,310	7,659	5,814	7,783	3,626	1,471	582	138	80,411,386	
Western Canada	152	88	5	59	27	71	50	4	0	0	627,009	
Alberta	95	65	3	27	17	32	42	4	0	0	422,891	
Saskatchewan	45	20	1	24	8	30	7	0	0	0	160,683	
Manitoba	9	3	0	6	2	7	0	0	0	0	27,587	
British Columbia	3	0	1	2	0	2	1	0	0	0	15,848	

*Incl. 122 service wells: N. Y. 30, Pa. 55, Ohio 9, Mich. 1, Kans. 10, Okla. 17. †Incl. 18 condensate wells: Okla. 7, E. Tex. 3, Tex. Gulf 6, S.W. Tex. 2. ‡Incl. all wells rigged up and/or drilling at month end. §Incl. Ariz., 1 dry, 5,142 ft.; Nev., 1 dry, 3,158 ft. ¶Incl. S.D. 5, Ariz.-Nev.-Idaho 2.

OKLAHOMA

New Keyes Gas Area in Cimarron Developing Fast

The new Keyes sand gas area in the northeastern portion of Cimarron in the Oklahoma Panhandle is undergoing a rapid development program since the opening of North Sturgis pool by Coltexo Corp. last winter at 1 C. J. Purdy, C NW SE 20-6n-9eCM.



Map of the Keyes sand gas area in Cimarron County showing completed wells, existing pools, and drilling wells.

The new Keyes sand Sturgis gas area lies about 15 miles west of the western flank of the vast Hugoton gas field which covers parts of three states. Cities Service Oil Co. has recently completed five gas wells in the new area with flows gaging from 8,150 M.c.f. to 33,850 M.c.f. of gas per day from perforations in the Keyes sand (basal Morrow). Keyes sand gas wells now extend through the full lengths of 5n-9eCM and 6n-9eCM.

Cities Service Oil Co. 1-C Ferguson, SE SE NW 35-5n-9eCM, was completed on open flow of 33,850 M.c.f. of gas per day for one of the largest wells in the area. Just east Cities Service is drilling 1-B Jordan in the SE SE NW Section 36. Shell Oil Co. is drilling a north offset and Stanolind Oil & Gas Co. has a location staked to the south.

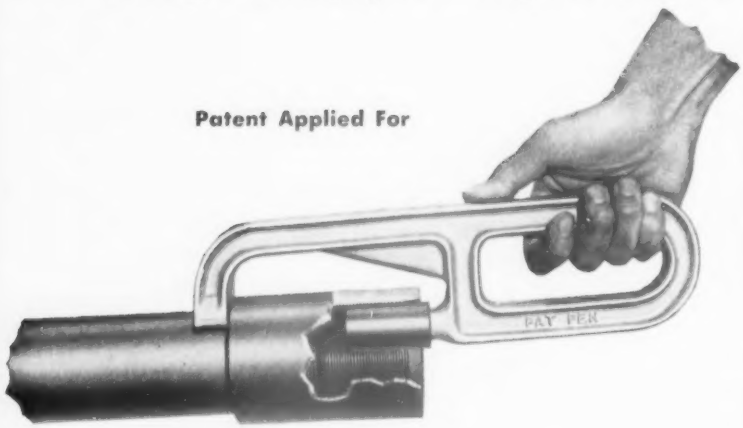
Columbian Fuel Corp., the other principal operator in the important new area of the Hugoton embayment, is running logs at the north end of the pool near the Colorado line at 1-E C. J. Purdy, C NW SE 17-6n-9eCM. Columbian completed 1-C C. J. Purdy, C NW SE Section 21, just west of the North Sturgis pool discovery well. The same operator is reperforating the Keyes after a squeeze job just west at 1-D C. J. Purdy, C NW SE Section 29. Robert Grady has a well under way in the C NE SW Section 26.

Cities Service 1-A Kinslinger, NE NE SW 36-6n-9eCM, and 1-A Migenback, SE SE NW Section 32 are both new gas wells, while off the east flank of the area 1-B Ferguson, SE SE NW 13-5n-9eCM, is also a new gas well.

The current activity in Cimarron County is the result of the significant discovery made last winter by Coltexo Corp. at 1 C. J. Purdy, C NW SE 20-6n-9eCM, opening North Sturgis pool. The discovery well had gas in both the Morrow and Keyes sand. The rapid development of the Sturgis area of Cimarron County and the Greenwood gas area of Morton County, Kansas to the northeast has been the most significant activity in the Hugoton embayment this year. Both pools have Morrow production and Greenwood also has Lansing pay.

Tubing Gripper *by Baird*

Patent Applied For



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Box 380 — Tulsa, Oklahoma

Arrow indicates Southwest Navina pool in Logan County. Macmillan Petroleum Corp. et al have established the first Simpson oil production in the vicinity.

Simpson Production Found In Southwest Navina Field

Macmillan Petroleum Corp., Blackwood & Nichols, and Richard S. Rheem have established the first Simpson dolomite oil production in the Southwest Navina vicinity and have opened up a new potential area for the field.

The trio's 1 Berg has been placed on production after a 24-hour test in which it flowed 211.86 bbl. of 39.3°-gravity oil. The well was completed from perforations at 6,430-65 and 6,475-91 ft. The production interval comprised 51 ft. of the total 140 ft. of Simpson dolomite. More intervals are expected to be opened later.

Preparation is being made to move in equipment on 2 Krout to reperforate following a previous cement squeeze job, and complete in the Wilcox oil sand. The 2 Krout encountered 73 ft. of oil zone. Operators are planning to go back in with a smaller circulating rig and complete tests in the Wilcox, Layton, and Pennsylvanian sands. Considerable difficulty was experienced in obtaining a water shutoff.

Southwest Navina pool was opened last winter in the heart of a dry-hole area of Logan County by Macmillan Petroleum at 1 Krout, about midway between Crescent and Edmond fields. The initial flow on 1 Krout was 1,200 bbl. of oil per day, and was pinched back to 300 bbl. per day on a 24/64-in. choke. It operated at this 300-bbl. rate which was the discovery allowable for 60 days. The well was then pinched back to a 16/64-in. choke to meet the allowable of 150 bbl. per day. Production is from the second Wilcox.

The Southwest Navina discovery well drilled from Pennsylvanian strata into Sylvan shale to establish the presence of a sharp elongate faulted anticline, similar to the Crescent anticline 6 miles to the north. The new Simpson oil discovery in the field uncovered a new fault block on this anticline.

Kendrick Area Activity

Wet gas in the Oswego lime has been established at George Deck, Hubbell et al 2 Gregg, NW NW SE 2-15n-5e, in the east Kendrick area of Lincoln County, currently central Oklahoma's most active spot.

On initial flow test the well yielded 4,000 M.c.f. of gas with some light distillate from the Oswego lime, representing the fourth Oswego lime discovery in this area in 2 months.

Hubbell is completing a good well at 6

Mitchell, SW SW NW 8-15n-5e, in the Oswego lime at 3,448-86 ft. The initial flow was 25 bbl. per hour. A stable flow was later reported on reduced choke at 100 bbl. per day. Activity is expanding throughout the north-half of 15n-5e as evaluation of the Oswego reservoir is under way. The Kendrick Oswego lime reservoir was established by Foster Drilling Co. High flow potentials have been reported at subsequent wells. Sun Oil Co. has had flow tests up to 100 bbl. of oil per hour at about 3,350 ft. after some acid treatment. Other participants in the expansion program in this important new field are The Texas Co. and Mid-Continent Petroleum Corp. Oswego production has been established in previously Prue sand producing areas of the field.

KANSAS

Oil and Gas Shows Tested At Comanche Prospect

Shows of oil and gas have been encountered at a rank wildcat 11 miles southwest of Robbins Ranch gas pool in northern Comanche County in the Hugoton embayment.

United Producing Co. is coring ahead below 5,230 ft. at 1 McCrary, C NW SE

Map of the Hugoton embayment area of southwestern Kansas and northwestern Oklahoma. This area is currently the most active wildcatting region in the Mid-Continent.

35-31s-18w, 4 miles northeast of Coldwater, Kansas. (D on map.) A drill-stem test in the Mississippian at 4,947-75 ft. gaged 48 M.c.f. of gas and recovered 108 ft. of gas-cut mud. Another test at 5,128-48 ft. gaged 23 M.c.f. of gas and recovery was 30 ft. of heavily oil-cut mud and 30 ft. of free oil. The top of the St. Louis had a slight oil show.

To the west in Meade County (B on map) Columbian Fuel Corp. is drilling a wildcat at 1 Armentrout, C SW NE 16-33s-30w, 2 miles northwest of Novinger pool and 1 mile northeast of Bruno pool in the western part of the county, where exploratory activity has been high this year.

Southwest of Meade in Seward County 5 miles west of Liberal-Light pool on the east edge of Southeast Liberal gas pool M. B. Armer had a deep test under way at 1 Cook, C SW SW 12-35s-33w. (C on map.)

Another important wildcat is rigging up on the east edge of the vast Hugoton gas area in Finney County at Continental Oil Co. 1 Kleysteuber, SE NE NW 29-6s-31w. (A on map.) This test is located 8 miles east of

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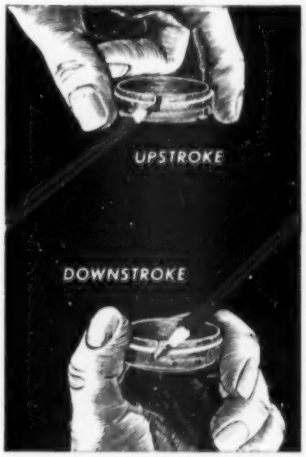

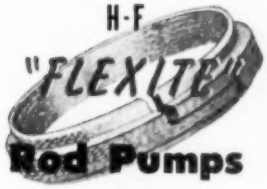

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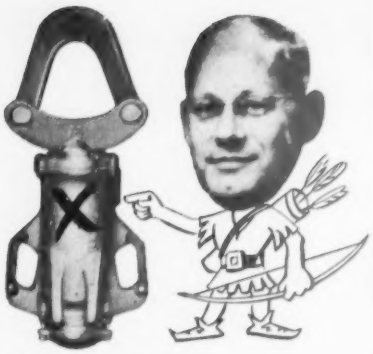

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Beyer pool, which is the first oil production within the limits of the Hugoton gas field.

Discovery Indicated In Sheridan County

Graham-Messman-Rinehart Oil Co. has an indicated discovery in the east-central part of Sheridan County in northwestern Kansas off the northwest flank of the Central Kansas uplift.

The 1 Sheets, SE NE SE 35-7s-26w, is located 3½ miles north of Studley pool. A drill-stem test in the Lansing recovered 90 ft. of muddy oil, while a second test at 3,766-90 ft. recovered 100 ft. of heavily oil-cut mud.

TEXAS

SOUTHWEST TEXAS

Two Zone Discovery Made In Eastern Milam County

A new two-horizon, gas-condensate-producing area, located 3½ miles west of Gause, in eastern Milam County, is being opened by D. Harold Byrd, Dallas independent operator.

The discovery well, 1 Lucinda Green, in the W. D. Thompson Survey, now is being completed dually in the upper Pettit lime, at 7,682-7,700 ft., and the Glenrose lime, in which casing is perforated at 6,245-6,316 ft.

In tests of the lower zone, the well produced at rates estimated from 5,000,000 to 10,000,000 cu. ft. of gas daily, open flow with an ungaged amount of condensate. Flowing pressure through 12/64-in. choke was 2,500 psi. with no gage of production.

From the upper zone, the well flowed at rates estimated from 2,000,000 to 6,000,000 cu. ft. of gas daily, open flow. No estimate of fluid production was reported. Flowing pressure was 1,990 psi. through 8/64-in. choke, and 2,300 psi. through 10/64-in. choke.

Hole originally was drilled to 8,210 ft. in Travis Peak, topped at 7,520 ft. Salt water was present in that horizon, and the hole was plugged back to 7,710 ft. The Rodessa zone, logged at 7,110-7,360 ft., was tight and carried no shows.

New Pay Zone Produces in West Fulton Beach Field

The spreading West Fulton Beach field, 5½ miles northwest of Rockport, in Aransas County, has been given another producing horizon, the Massive "I" sand, with the completion by Renwar Oil Corp. of its 5 State, located offshore in Tract 105, Copana Bay. The new pay, open through casing perforations at 7,835-39 ft., produced at the rate of 168.65 bbl. of 41.1°-gravity oil per day through ⅛-in. choke with tubing pressure gaging 1,250 psi. Gas-oil ratio was 747 cu. ft. per barrel. Hole was drilled to 9,103 ft.

TEXAS GULF COAST

Indicated Woodbine Well Completed in Georgetown

Woodley Petroleum Co. and Moran Corp. have completed their 2 Bruton estate, indicated Woodbine oil-discovery well in the Fort Trinidad field, on the Houston-Madison county line, in the field's deeper Georgetown lime

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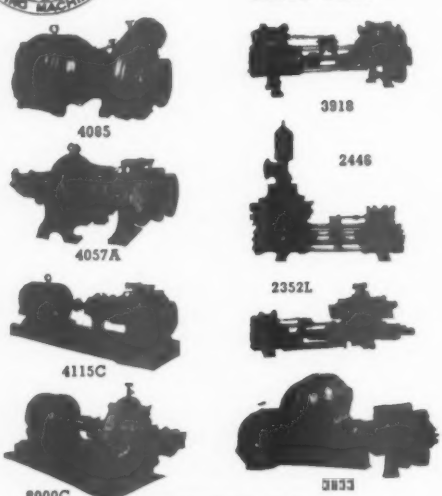

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pay zone, in which the well is bottomed at 9,166 ft.

From the Georgetown, topped at 9,152 ft., and open to the bottom of the hole, the well flowed 199 bbl. of 41.6°-gravity oil per day through ⅜-in. choke with tubing pressure of 1,500 psi. and gas-oil ratio of 1,500 cu. ft. per barrel.

Indicated Woodbine production, first for the field, was in the Dexter zone, in which an open-hole drill-stem test at 8,605½-21½ ft. yielded 4,500 ft. of 38°-gravity oil. At the time of the test, the latter part of May, this was the furtherest coastward prospective production had been found in the Woodbine, prolific pay zone of the East Texas and other East Central Texas fields. Since then Woodbine production has been found 25 miles to the southwest in the South Madisonville area of northern Grimes County.

The Fort Trinidad field, discovered in 1951, and now receiving active development, produces not only from the Georgetown lime but also from the overlying Buda lime, both below the Woodbine.

New Frio Oil Production Opened in Van Vleck Area

Skelly Oil Co.'s previously indicated new oil-discovery well, located 1½ miles east of its Bay City (Van Vleck) field, 2 miles north of Van Vleck, in northern Matagorda County, is showing for a good producer in completion tests now under way.

Following a succession of tests of deeper zones, which yielded gas and/or oil, and water, the well has been plugged back and casing perforated in the upper middle Frio sand which, in an open-hole drill-stem test early last month, showed promise of production with a recovery of more than 4,230 ft. of clean oil.

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Flow from these perforations, at 8,476½-79½ ft., has been at the rate of 165 bbl. of 33.4°-gravity oil per day through 9/64-in. choke with 810-psi. pressure on the tubing and gas-oil ratio of 440 cu. ft. per barrel.

The well had been drilled to 11,799 ft. and casing run to 11,700 ft. Depth zones tested were at 11,613-20 ft., 11,602-09 ft., and 9,306-10 ft.

The present pay zone is believed to correlate with the first Granbury sand, principal producing horizon of the prolific Sugar Valley field, 4 miles to the east.

The Bay City field, originally known as the Van Vleck field, immediately to the west, was discovered by Skelly Oil Co. in 1934. It now produces gas and/or condensate or oil from a series of Marginulina-Frio sands ranging in depth from 7,000 ft. to 8,500 ft.

WEST TEXAS

Devonian Discovery Rates High Potential

Anderson-Prichard Oil Corp. and J. C. Barnes 1-E University, 7-7-University Lands Survey, northeast Andrews County, has completed as one of the most prolific producers yet to be reported.

Calculated potential of 3,353 bbl. of 44° oil a day was based on an actual 6-hour flow of 838.23 bbl. of oil through a 1-in. choke. Devonian perforations were from 12,322-12,350 and 12,360-12,385 ft.

Top of the Devonian was 12,326 ft. and top of the Ellenburger was 13,479 ft., on elevation of 2,994 ft. The well had made several flows of oil on tests of the Devonian, some running around 100 bbl. hourly, and then developed flowing oil from the Ellenburger until water cut in. Operators decided against dual completion when repeated attempts failed to shut the water off, and plugged back from total depth of 13,510 ft.

Anderson-Prichard 1-F University, a northeast stepout, had top of the Devonian at 12,396 ft. Tests had not been made but cores to 12,439 ft. contained oil stains.

Upton County . . . Gulf Oil Corp. 2 McElroy-State, northeast stepout to its Devonian discovery of AdaMc field, had a possible 335 ft. of Devonian pay section. Last drill-stem test from 10,335-10,375 ft. recovered 1,080 ft. of clean oil, plus oil-cut drilling mud, with no water. First test to show oil was from 10,040 ft.

Reeves County . . . Magnolia Petroleum Co. 1 Rape, wildcat 12 miles west of Coyanosa, flowed 82 bbl. of new oil in 4 hours from open hole at 11,100-11,258 ft. The section being tested is either basal Permian or top of the Pennsylvanian.

APPALACHIAN AREA

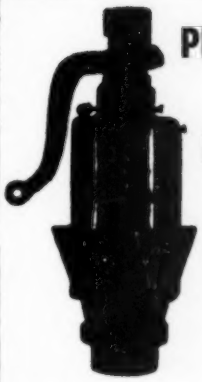
OHIO

The Oxley Run area of Pike Township, Coshocton County, is getting a play now due to the response of the Clinton sand to fracturing. National Gas 6 D. G. Rine, Section 4, made 75 bbl. daily after fracturing sand found at 3,085-3,135 ft.

In the north part of Perry Township, Coshocton County, Leonard Blood's 4 (7) H. L. Wilt, Section 6, made 140 bbl. in 24 hours after fracturing sand, found at 3,128-3,178 ft.

A second gasser was completed in the eastern part of Butler Township, Knox County, Ohio Fuel 1 Goldie Wolfe, Section 19, Clinton at 3,088-3,105 ft. gaged 2,200,000 cu. ft. natural.

Wiser Oil Co. 3 C. R. Smith, Section 3,



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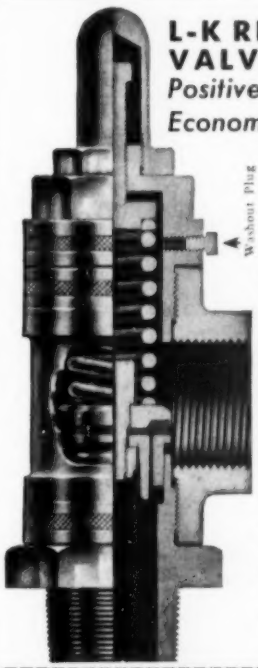

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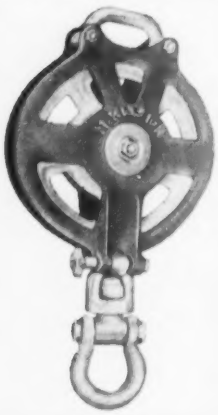

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Canaan Township, Wayne County, topped the Newburg sand at 2,700 ft. and at 2,746 ft. gaged 225,000 cu. ft. natural and shut in at 1,000,000 cu. ft. after acidization.

NEW MEXICO

SOUTHEAST NEW MEXICO

Delaware Basin Wildcats Continue Testing

Little change over the past week has been reported from the deep Delaware basin tests, but operators are watching all wells closely.

Richardson & Bass 1 Cobb-Federal, one of the few basin tests to drill into basement rock, likely will change the outlook for future drilling. This well was in granite at 16,459 ft., then plugged back to 12,573 ft. to test. At last report it was swabbing after acidizing through perforations at 12,492-12,524 and 12,536-54 ft.

Richardson & Bass 1 Harrison-Federal was drilling limestone at 14,555 ft.

Stanolind Oil & Gas Co. and Gulf Oil Corp. 1 Guadalupe Foothills Unit was drilling unidentified limestone at 12,379 ft.

White Ranch test . . . This area, in southeast Chaves County, gained another exploratory test, to be drilled immediately. The venture is Great Western Drilling Co. 1 White Ranch, 1-12s-28e. Location is 28 miles southeast of Roswell and about 4 miles southwest of the White Ranch discovery well. Projected depth was 8,500 ft.

CANADA

Commercial Production Assured at Pembina Test

Commercial light-gravity crude-oil production has been assured by the team of Socony-Vacuum Exploration Co. and the Seaboard-Honolulu-Merrill group at its wildcat in the Pembina area of central Alberta that gave up an encouraging oil showing in the Cardium formation over 2½ months ago. During the latest swab test in this strike, which lies 65 miles southwest of Edmonton and 45 miles west of Wizard Lake Devonian oil wells, oil flowed at rate of about 384 bbl. daily.

The discovery well is Socony-Seaboard 1 Pembina, LSD 4, 16-48-8w5, 15 miles northwest of the Canadian Delhi et al. 1 Minnehik Madison "wet" gas discovery and 36 miles south of Select Oils' Chip Lake "wet" gas strike.

The 1 Pembina was taken down to 9,425 ft., for tests of lower horizons, after the oil showing was obtained, and then hole was plugged back and 7-in. string of casing was run to 5,422 ft. The Cardium intervals 5,339-48 and 5,348-57 ft. were perforated with four shots per foot.

Initial swab test gave up a 10-ft. recovery of oil and fluid raised 500 ft. during 10 hours. Last week tubing was run, and fluid rose 400 ft. in 10 hours and crew swabbed 1½ bbl. of oil from the hole. Fluid again rose 425 ft. in 10 hours. Well was then swabbed, and it commenced flowing oil through a ¼-in. choke at rate of 5½ bbl. hourly (132 bbl. per day) with b.s.and w. cut being 0.4 per cent. Gravity of the crude is between 37.5° and 38.1°. A further 4½-hour flow test through ¼-in. choke made clean oil at rate of 385 bbl. daily.

This Cardium oil discovery well is located on a 98,800-acre Crown exploration reservation farmout that Socony acquired under agreement from Seaboard and associates. The first oil encouragement was obtained in March of this year, when a 40-minute drill-stem test of the Cardium interval 5,335-76 ft. gave a sustained air blow and recovery of 110 ft. of heavily oil and gas-cut mud. Thickness of the oil pay zone at this strike is not known.

MICHIGAN

New Pay at Clayton

Don Rayburn was being credited this week with opening a new horizon oil producing section in Clayton pool, Arenac County—in the so-called Detroit River "sour zone"—following perforation and acid treatment at this shallower depth in an older Richfield horizon oil producer on the north flank of the field.

The Rayburn 2 Thompson-Green, SE SE SE 4-20n-4e, Clayton Township, was perforated with four shots per foot from about 3,487 ft. to about 3,507 ft. After being acidized with 4,000 gal. in this zone well produced as much as 10 to 11 bbl. of oil an hour flowing on initial tests. During the first 6 days after treatment well had produced 670 bbl. of oil to storage, and in the first 10 to 11 days a total of 1,200 bbl. of net oil had been produced. Production was interrupted at this point with an excessive paraffin condition and clean-out was in progress. Operator is considering this new well as a 75-bbl. a day producer at which rate it is expected that oil flow will try to be maintained.

The 2 Thompson-Green Detroit River oil well is considered as an important develop-

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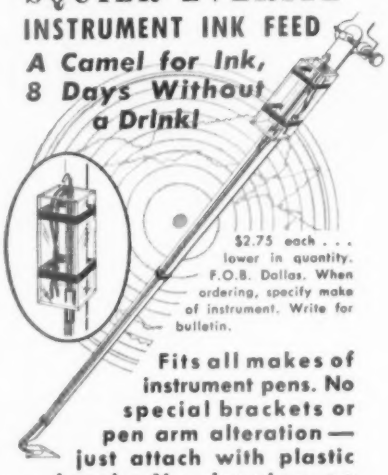

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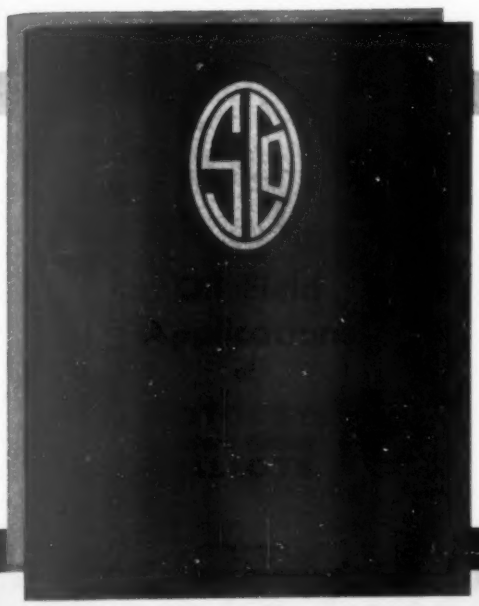

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ment in this older pool, but other drilling in the general area of the Clayton pool has indicated that this horizon will be spotty.

Flowing at a restricted rate of 220 bbl. of oil a day after acid treatment in the Richfield with 3,000 gal., the Louis Rose 1 Blaney, SE NW NW 12-20n-6w, Winterfield Township, Clare County, a Cranberry Lake field well, was completed for one of the best wells in the pool. The 1 Blaney, offsetting other Richfield oil wells, was originally drilled as a Dundee test and was completed dry in this upper objective. Well was rated at 90 bbl. of oil a day natural at 5,150 ft., total depth.

The Dow-Brazos-Taggart Bros. Gas Co. 1 Hansen et al. Unit, SW SE SE 22-19n-18w, Hamlin Township, Mason County, was drilled out dry in the Niagaran oil objective zone at 4,357 ft., total depth. This north offset to the Hamlin area oil discovery well (in the Niagaran) brought the total number of failures at offsets to the discovery to three. This most recent dry hole, following the other two, was considered to be a serious blow to area development, specifically, and to the development of Niagaran oil and gas reserves, generally, on the western rim of the Michigan basin.

ROCKY MOUNTAIN

WYOMING

New Locations at 1953 High in Wyoming

A total of 25 new locations were announced in Wyoming this week in both development and exploratory classifications. Twelve of the new wells were exploratory.

The total of 26 for the week is the highest reached to date in 1953 in the state. Rotary rig activity has been steady through the state for the most of the first half of the year, and has consistently led other states in the region. Wildcat locations announced in the current week were spotted in all parts of the state, with several in rank areas which have had little or no previous drilling. Among these is a location for a 10,000-ft. Tensleep test in Teton County, one of the very few to be drilled in this county.

Placid Oil Co. is moving in materials for the well, 1 Government, SW SE SE 11-42n-112w, in the Sohare Creek area. It is the first for this operator in Wyoming, and is about 4 miles south of the southeast boundary of Stanolind Oil & Gas Co.'s Spread Creek unit which was unsuccessfully tested to a depth of 7,581 ft. in Mowry in NE SE SW 25-44n-114w.

Southeast of the city of Casper Amerada Petroleum Corp. made location for 1 Government-Brannan, SW NW NE 29-33n-78w, a 6,000-ft. test to Tensleep on the southern rim of the Powder River basin. The location follows extensive seismic work through the area.

Other wildcat locations included new starts in Johnson, Sublette, Niobrara, Carbon, Converse, Albany, and Big Horn counties.

Manderson Discovery To Continue Testing

L. J. Peterson is preparing for further production tests at the 1 Government, C SW NW 2-49n-92w, south of the Manderson unit in Big Horn County. The well reported a flow of oil at the rate of 960 bbl. per day through ⅜-in. choke on a 5-hour test. Longer tests have not been run due to lack of storage facilities.

The well has not been acidized, contrary to the usual procedure in the area where production is from Phosphoria lime.

COLORADO

New Adams County Discovery Indicated

Triangle J Oil Co. recovered oil on drill-stem test of the "J" sand at 1 White, NW NE NE 21-1s-57w, Adams County, 2 miles north of production in Little Beaver field, for another apparent discovery in the active area. Test was run of the interval 5,571-91 ft and with tool open 50 minutes the recovery was 750 ft. of clean oil, 140 ft. of oil-cut mud, and 140 ft. of mud and drilling fluid. Shut-in pressure was 1,340 psi. The well went to a total depth of 3,646 ft. and the operator is running casing.

The general eastern Adams-western Washington County area has been extremely active during most of 1953. Triangle J has just completed a discovery at 1 Morris, NE NE SW 27-2s-57w, in the South Badger Creek area, Adams County, for a pump gage of 250 bbl. of oil daily. Production is from the "D" sand through perforations in the zone 5,396-5,414 ft. Two offsets to this discovery, one by this operator and one by Sinclair Oil & Gas Co. have already shown for commercial production.

Logan County Discovery Flows at High Rate

Falcon Seaboard Oil Co. has tested 1 Thompson, SE SE SE 7-8n-54w, Logan County, for a 15-hour flow of oil at the rate of 18½ bbl. per hour. The discovery was perforated in "J" sand from 6,560-69½ and 6,542½-45 ft., and test was on 48/64-in. choke. Operator is continuing to test.

NEBRASKA

Two Western Nebraska Discoveries Completed

Vaughey & Vaughey et al. have completed 1 Durland Trust, SW SW NE 15-14n-56w, Kimball County, for a pump gage of 68 bbl. of oil per day with production from the "J" sand.

In Cheyenne County, Ohio Oil Co. tested a flow of 3,500 M.c.f. of gas per day from "D" sand at 1 Hill, SE NE NW 30-13n-50w. The operator has shut in the well pending market outlet. The wildcat opened the seventh pool in the general West Sidney area of this county.

NORTH DAKOTA

New Wildcat Activity Slated for Both Dakotas

Wildcat locations of considerable importance were announced in both North and South Dakota during the current week. The Texas Co. will drill in C SE SW 8-153n-95w, in the Charlson area of McKenzie County, North Dakota, the first test for this operator in its own right in the area.

On the east side of the Williston basin Sohio Petroleum Co. will drill 1 Artz, NE NW SW 14-163n-82w, Bottineau County, first test of a 10,000-acre block held by this operator in the area. Location is about 12 miles west of production.

E. Wilson Germany and Cardinal Drilling Co. have staked two wildcats in the central portion of the state. Locations have been made for 1 Faul, SE NW 13-148n-73w, Wells County, and 1 Fallon, NE SE 22-148n-74w, in Sheridan County.

New South Dakota locations included one in the Highmore area of Hyde County where Hornet Oil & Gas Co., a South Dakota operator, will drill in NE NW SW 2-116n-71w. New World Oil Co. also made location for a wildcat in NW NW 11-4n-17e, Pennington County.

Rank Wildcat Reports Show

Amerada Petroleum Corp. 1 May, NW NE 9-139-100w, in the Fryburg area of Billings County, tested the interval 9,398-9,466 ft. for 70 minutes before packer failed. A 2,000-ft. water cushion was used and the recovery was 659 ft. of heavily oil and gas-cut water cushion, 276 ft. of water cushion cut from 30 to 50 per cent with oil, 736 ft. of oil and gas-cut water cushion, and 920 ft of gas-cut drilling mud.

This wildcat, located south of the Nesson anticline and east of production along the Cedar Creek anticline in Montana, is in the deeper part of the Williston basin and is the first test to be drilled off the Nesson anticline by Amerada. Top of the Madison in the 1 May has not been announced.

CALIFORNIA

Buena Vista Link Well Being Completed

Standard Oil Co. of California was in process of completing an Antelope shale test in Buena Vista Hills to prove the new zone is continuous along the 7½-mile northwest-southeast anticlinal structure. Successful completion of 525 McNee will eliminate the 1-mile interval which separates seven northern producers from the 20 further southeast.

Like most of the other Antelope wells, 525 McNee encountered a thick fractured-shale zone. With 8⅝-in. casing set at 3,930 ft., 546 ft. of perforations were contained in the liner which was landed at 4,480 ft. Location of the link well is in SW 36-31s-23e.

The fractured shale zone has been developed almost entirely on 160-acre spacing, because of anticipated low recoveries. Some wells tested at initial rates of over 500 bbl. daily but the majority were completed for about 200 bbl. daily. Current average output of the 27 wells completed to date is about 150 bbl.

Yolo Gas Find Completed

Ohio Oil Co. completed its wildcat 1¼ miles northeast of the Pleasant Creek field, Yolo County, as a new gas field discovery. Initial production rate was 5,250 M.c.f. daily through a ½-in. bean, from a perforated interval at 3,575-89 ft. Following the test the discovery was shut in pending a pipe-line outlet. Production is believed to be from a stratigraphic trap in sands of Cretaceous age. Pleasant Creek gas production is from Eocene sands at about 2,800 ft.

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MISSISSIPPI

Wilkinson County Gets New Wilcox Oil Field

Wilcox exploration in southeastern Mississippi has resulted in the opening of another new field, located 4 miles south of Saukum, in eastern Wilkinson County.

The discovery well, one of a long list of stratigraphic tests which Gulf Refining Co. has drilled the past year on its extensive Crosby Lumber & Manufacturing Co. block in the above county, flowed at the rate of 107 bbl. of 33.2°-gravity oil per day through 10/64-in. choke with tubing pressure gaging 200 psi. flowing.

The well, 31 Crosby, logged tight sand at 7,088-92 ft. and oil sand at 7,092-96 ft. It was drilled to a total depth of 7,700 ft. Casing, run through the pay to 7,160 ft., is perforated at 7,088-94 ft.

Location, in 31-3n-1e, is 10 miles southeast of the Wilkinson field, nearest production. The field has been named officially as "Saukum."

LOUISIANA

SOUTH LOUISIANA

New Pay Zones Opened In Five Coastal Fields

New pay zones were opened officially the past week in at least five more South Louisiana fields. These fields included Bayou Penchant and Lake Hatch, in Terrebonne Parish; Eugene Island Block 32, in the Gulf of Mexico off the coast of St. Mary Parish; Southwest Pass, in Plaquemines Parish; and Bayou Couba, St. Charles Parish. New-pay discovery wells completed were:

Bayou Penchant—Superior Oil Co. 1-A LaTerre, completed flowing 137 bbl. of 39.6°-gravity oil per day through 8/64-in. choke from casing perforations at 11,616-21 ft.

Lake Hatch—Union Oil Co. of California 7-B Louisiana Land & Exploration Co., completed flowing 1,500,000 cu. ft. of gas per day through 9/64-in. choke with spray of 74.8°-gravity condensate from casing perforations at 6,548-58 ft. This well is north extension of the field and midway between this field and Orange Grove field.

Eugene Island Block 32—Pure Oil Co. 6-A State Lease 832, completed flowing 152 bbl. of condensate with 5,784,000 cu. ft. of gas per day through 9/64-in. choke from casing perforations at 10,662-84 ft., 10,700-02 ft., and 10,728-36 ft. This well recently blew out and burned out of control for 11 days.

Southwest Pass—California Co. 1 Plaquemines, completed flowing 201 bbl. of 31.7°-

(Continued on page 167)

WILDCAT COMPLETIONS

SOUTHWEST TEXAS*

Atascosa County: George W. Delker 1 Schorsch, Tract 21, Natascosa Colony Farms. IPP 47.35 BOPD, 21°, Queen City 1,537-39 ft. (casing perforations). TD 1,549 ft. in Carrizzo. Elev. 430.5 ft., Carrizo 1,539 ft. (Extends La Parita area.)

Brooks County: Humble Oil & Refining Co. 6 Santa Fe Ranch-Julian Pasture, San Salvador del Tule Grant. Dry. TD 10,005 ft.

Duval County: Bridwell Oil Co. 1 Marshall, George Liebtenberg Sur. 220, A-1860. Dry. TD 9,351 ft.

Bridwell Oil Co. 1 Salinas, Tract 3, Copita Farm & Garden Tracts. Dry. TD 5,753 ft.

Chicago Corp. 1 Lopez, Sur. 546, A-1751. Dry. TD 5,502 ft.

Edwards County: Spencer Chemical Co. 1 Earwood, CCSD&RGNG Sur. 149. Dry. TD 10,058 ft.

Frio County: Howeth & Mason 1 Nowlin, John W. Crawford Sur., A-1080 (1 mile south of Big Foot field). Dry. TD 3,522 ft.

Gonzales County: Lone Star Producing Co. 1-A Ada Houston Cox, Sarah Seely Lge., A-60. Dry. TD 5,285 ft.

Guadalupe County: Lake Rice Mill, Inc., 1 Gerdes, R. M. Forbes Sur. Dry. TD 2,006 ft.

Jim Hogg County: Sun Oil Co. 5 Lewis, Agua Nueva de Arriba Grant. Dry. TD 5,154 ft.

Jim Wells County: Jake L. Hamon 1 Hoffines, John Welder Sur. 10, A-525. IP 1,740 M.c.f. daily, open flow, with 2½ BC per million cubic feet, ¼-in., 49.6°, Frio 4,618-22 ft. (casing perforations). TD 5,550 ft. (New field—Hoffines.)

LaGloria Corp. 1 Miller, Reese & Dunn Sur., O&S Subd., Block 7. Dry. TD 5,829 ft.

Leland Palmer et al. 1 Floyd, Adams Staples Farm Lots, Block 22. Dry. TD 6,379 ft.

Pontiac Refining Co. 1 Kozielski, Hancock Loving & Ruby Subd., Los Presenos de Abajo Grant, A-148. Dry. TD 5,317 ft.

La Salle County: Kirkwood & Morgan, Inc., 1 Beckman, H&GN Sur. 120, A-1064. Dry. TD 5,177 ft.

Mason County: Frank H. Carpenter 1 Bradshaw, Indianola RR Sur. 46. Dry. TD 1,095 ft.

McMullen County: Alaska Steamship Co. and Newman Brothers Drilling Co. 15-B South Texas Syndicate, E. M. Beall Sur. 28. Dry. TD 6,260 ft.

Fitzpatrick Drilling Co. 1 Booth, James Garner Sur. 6, A-5. Dry. TD 7,016 ft.

Medina County: R. S. Hays 1 Adams, James L. Ewing Sur. 508. Dry. TD 1,710 ft.

San Patricio County: Big "6" Drilling Co. 1 Dix, AB&M Sur. 8, Sec. 32, A-352. IP 68 BOPD, ⅛-in., 39°, casing perforations 5,013-18 ft. TD 6,216 ft. (New field.)

Plymouth Oil Co. 12-B Welder, Welder Ranch Subd. IP 28,500 M.c.f. daily, open flow, casing perforations 7,650-54 ft. TD 8,005 ft. (New field—North Pasture.)

Pontiac Refining Co. 1 Rothrock, Taft Farm Lands, 3rd Addition. Dry. TD 5,998 ft.

Starr County: T. R. Cunningham 1 Perez, Share 9-A, Porcion 105. Dry. TD 3,015 ft.

Nelson Bunker Hunt 1 Roos-Bennett, Clopton Subd., Porcion 91. Dry. TD 3,359 ft.

Val Verde County: Meek & Page Independent Oil Operators 1 Babb, ERR Sur. 84, Block D-8. Dry. TD 2,605 ft.

Wilson County: Maple C. Hughes 1 Mattke, Manuel Ximines Sur., A-22. Dry. TD 3,041 ft.

TEXAS GULF COAST

Austin County: American Republics Corp. 1 Boyd, S. F. Austin Lge., A-7. Dry. TD 9,938 ft. (West flank of San Felipe dome).

Brazoria County: Kirby Petroleum Co. 1 Kaufman, HT&B Sur., A-232. Dry. TD 7,205 ft.

Burleson County: Morris K. Womack et al. 1 Coffield, Abner Smith Lge., A-209. Dry. TD 3,416 ft.

De Witt County: Poco Rio Oil Co. 1 Koehler, Sam Betts Sur. Dry. TD 7,806 ft.

Fayette County: Hamman Oil & Refining Co. et al. 1 Thomason, John McGown Sur., A-238. Dry. TD 2,142 ft.

Fort Bend County: Lamar Hunt Trust est. 1 George, J. H. Polley Sur., A-70. Dry. TD 7,515 ft.

Galveston County: The Texas Co. 1 Lobit, R. Anthony Sur., A-630. Dry. TD 11,350 ft.

Goliad County: Louis H. Haring 2 Calhoun, Maria de Jesus Ybarbo Sur., A-51. IP 48.68 BOPD, 7/64-in., 47.6°, Pettus sand 4,141-45 ft. (casing perforations). TD 4,162 ft. (New field—Bravo Pettus.)

Houston Natural Gas Production Co. 1 Kilgore, Thomas King Sur., A-173. Dry. TD 4,215 ft.

Hardin County: SOCS Vratis 1 Williams, Luke Bryan Sur., A-77. Dry. TD 6,932 ft.

Harris County: Harrell Oil Co. et al. 1 T. A. Lindell unit, C. W. Fritz Sur., A-971. Dry. TD 7,503 ft.

Jackson County: J. M. Huber Corp. and P. R. Rutherford 1 Lay, Andrew Dunlap Sur., A-104. Dry. TD 5,174 ft.

Nelson B. Hunt 1 Hollingsworth, Eli Mercer Sur., A-54. Dry. TD 4,720 ft.

Jefferson County: F. M. O'Connor 1 Brandt, W. Carr Sur., A-102. Dry. TD 8,418 ft.

La Salle County: Kirkwood & Morgan, Inc., 1 Beckman, H&GN Sur. 120, A-1064. Dry. TD 5,177 ft.

Live Oak County: Alamo Drilling & Production Co. 1 Gomillion, J. H. Claunch Ranch Subd. Dry. TD 1,293 ft.

Victoria County: W. H. Cocke and R. H. Goodrich 1 Kohutek, SA&MG Sur. 5, A-316. Dry. TD 600 ft.

Wharton County: R. Thomas McDermott 1 Cockburn, S. A. Larche Sur., A-268. Dry. TD 8,065 ft.

Progress Petroleum Co. of Texas 1 Hermann, I&GN Sur. 13, A-226. IP 1,000 M.c.f. daily and 20 BCPD, 11/64-in., casing perforations 3,947-52 ft. TD 5,662 ft. (New pay in Southwest Hutchins field.)

EAST TEXAS

Anderson County: Thomas Jordan, Inc. 1 Mrs. Mae McFarlane, W. S. McDonald Sur., A-43. Dry. TD 5,962 ft.

Hunt County: B. L. Hoover 1 D. A. Steele, E. A. J. Evans Sur., A-300. Dry. TD 3,380 ft.

Navarro County: R. L. Wheelock 1 P. T. Fullwood, J. C. Blankenship Sur., A-100. Dry. TD 3,283 ft.

WEST CENTRAL TEXAS

Brown County: Sloan Wells 1 Otto Leatherwood, Blk. 18, Jean Delgado Sur. 789. IPP 30 BOPD, 42°, pay 1,190-95 ft. TD 1,209 ft.

Callahan County: Butler & Peebles 1 A. E. Dyer, Sec. 56, BBB&C Sur. IP 205 BOPD, 8/64-in., 43°, Cook sand 1,682 ft. TD 1,687 ft.

Creslenn Oil Co. 1 J. H. Lilley, Sec. 17, J. Lahee Sur. Dry. TD 3,877 ft., elev. 1,813 ft., Ellenburger 3,877 ft.

Sik Katz 1 Mrs. Rosa McWhorter, Sec. 142, GH&H. Dry. TD 4,090 ft., elev. 1,936 ft., Ellenburger 3,965 ft.

Coleman County: Andree 4 J. W. Hunter Jr., Sec. 742, D. Frazier Sur. IPP 16 BOPD, 40°, pay 774-81 ft. TD 800 ft.

Coronet Oil Co. 62-2 J. P. Morris Estate, 66-2-GH&H. Dry. TD 3,885 ft.

Mayhew Machine Co. 1 J. J. Harris, MEP&P Sur. 81. Dry. TD 2,208 ft.

Kenneth J Rich 1 W. E. Ferguson, Blk. 9, Pleasant Young Sur. 494. IPP 25 BOPD, pay 1,296-1,310 ft. TD 1,348 ft.

Westates Petroleum Corp. 1 Sam R. Lindsey, Sec. 7, Daniel A. Murdock Sur. 738. Dry. TD 2,505 ft.

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WILDCAT COMPLETIONS

Eastland County: Traders Oil Co. of Houston 1 W. H. Davis, P. L. Price Sur. Dry. TD 3,689 ft.

Fisher County: Rankin & Pitcock 1 A. J. Griffin, Blk. 29, James Leggett Subd., A. J. Long Ranch. Dry. TD 3,370 ft.

West Central Drilling Co. 1 A. W. Canfill, 4-2-H&TC. IPP 40.7 BOPD, pay 4,997-5,007 ft. TD 5,995 ft.

Haskell County: S. C. Herring 1 Charles Grissom, McHenry Windburn Sur. 121. Dry. TD 5,673 ft.

Roark, Hooker, Hill & Perini 1 D. P. Ratliff, 25-1-H&TC. Dry. TD 5,230 ft., elev. 1,553 ft., Strawn 4,609 ft.

The Texas Co. 1 H. D. Bland, J. Jamison Sur. 66. Dry. TD 5,510 ft., elev. 1,552 ft., Mississippian 5,486 ft.

Palo Pinto Country: G. B. Butterfield 1 C. H. Putt, Blk. 80, A-191, J. W. Frost Sur. IP 600 M.f.g., gas sand 2,082 ft. TD 4,321 ft.

Parker County: Garland Anthony 2 Ella Gilbert, J. Jacobs Sur., A-741. IP 65 BO in 12 hr., ¼-in., 42°, pay 4,012 ft. TD 4,067 ft.

Stephens County: Woodson Oil Co. 1 Donnell-Douglas, on line between Scruggs and Critser Sur. Dry. TD 4,783 ft., elev. 1,207 ft., Ellenburger 4,672 ft.

Stonewall County: Youngblood & Foree 1 Henry Schmidt, Sec. 28, BBB&C. IP 61 BOPD, 12/64-in., 40°, conglomerate 5,954-64 ft. TD 5,989 ft.

Throckmorton County: W. M. Summers 1 Travis CSL, Blk. 25, A-254, TCSL. Dry. TD 5,317 ft.

NORTH TEXAS

Archer County: Greenspan & Johnson 1 L. Hudson, Blk. 83, Harris Subd. IPP 16.5 BOPD, pay 1,160 ft. TD 1,165 ft.

Hanes & Breeden 1-A W. L. Lyles, M. Galon Sur., A-137. Dry. TD 4,017 ft.

Hunter Co., Inc. 1 Adam Furr, Blk. 7, Dallas CSL, A-113. IP 165 BOPD, 10/64-in., Strawn 4,849 ft. TD 5,561 ft.

Magnolia Petroleum Co. 1 J. B. Miller, Blk. 19, Miller Subd., ATNCL Sur. Dry. TD 1,800 ft.

Novi Equipment Co. 1 John Purcell, Blk. 74, Jefferson CSL. IPP 25.5 BOPD, pay 1,106-12 ft. TD 5,512 ft.

Reno Oil Co. and North American Car Co. 1-C O'Donohoo, SPRR Sur. A-411. Dry. TD 4,410 ft.

Harold Shappell 1 C. T. Hodges, TE&L Sur. 2407. Dry. TD 1,500 ft.

Clay County: L. T. Burns 1-A Gowan, Wm. Hill Sur., A-206. IP 292 BOPD, 6/64-in., 43°, pay 5,958-5,985 ft. TD 6,070 ft.

G. W. Cooper 1-A J. P. Bobby, M. Scurlock Sur., A-423. Dry. TD 4,952 ft.

Ralph Harper 1 Ed Watson, Blk. 2686, TE&L Sur., A-519. IPP 35 BOPD, 40°, pay 4,343-53 ft. TD 4,523 ft.

G. E. Kadane & Sons et al 1 R. S. Cowan, W. Cocke Sur., A-88. Dry. TD 6,150 ft.

Murphy Oil Co. of Oklahoma 1 J. T. Starnes, Blk. 2, T. J. Belcher Subd. Dry. TD 4,700 ft.

Clay County: Humble Oil & Refining Co. 1 Leola P. Hapgood, E. B. Carver Sur. IPP 26.3 BOPD, 42°, conglomerate 6,186-96 ft. TD 6,859 ft.

Grayson County: Fain & McGaha 1 Deckard, T. W. Graham Sur., A-477. Dry. TD 6,415 ft., Ellenburger 6,313 ft.

B. M. Hester & Sons 1 Pelphrey, Patsy Kitchen Sur., A-668. Dry. TD 5,300 ft., Ellenburger 5,086 ft.

Howell, Holloway and Howell 1 Anna Miller, G. M. Dial Sur., A-365. Dry. TD 9,467 ft.

Jack County: O. J. Perren and R. Guy

Carter 1-B J. S. Rhodes, W. Higgins Sur., A-2199. IP 949 BOPD, 28/64-in., pay 4-340-60 ft. TD 4,372 ft. Bryson area.

Knox County: Sid Katz 1 Masterson Bros., 19-4-D&W. Dry. TD 6,284 ft.

Wilbarger County: Dublin Kiel 1 Arthur Kreig, 31-9-H&TC. Dry. TD 2,131 ft.

Young County: R. J. Watson 1 W. P. Easley, Sec. 225, TE&L Sur. IPP 10.8 BOPD, pay 954 ft. TD 959 ft.

R. J. Watson 2 Easley, TE&L Sur. 225, IPP 32 BOPD, 37°, pay 953 ft. TD 957 ft.

NORTHERN NEW MEXICO

Rio Arriba County: Superior Oil Co. 1-5 Sealy, NW NE SE 5-25n-6w. IP 1,500 M.c.f. of gas in 3 hours, Pictured Cliffs 2,352-83 ft. TD 2,397 ft. (Pictured Cliffs discovery, new field.)

WEST TEXAS

Cochran County: J. D. Wrather Jr. 2 E. Culp-Hobby, 10-Z-PSL. Dry. TD 11,800 ft., elev. 3,894 ft., Wolfcamp 9,041 ft., Mississippian 11,600 ft.

Hockley County: Bankline Oil Co. 5-1 Mallet Land & Cattle Co., 5-34-Concho CSL. Dry. TD 10,532 ft., elev. 3,549 ft., Strawn 10,390 ft.

Great Western Drilling Co. 1 G. W. Broome, 75-A-R. M. Thompson Sur. Dry. TD 10,121 ft., elev. 3,437 ft., Strawn 9,830 ft.

Kent County: Creslenn Oil Co. 1 Williams, 61-5-H&GN. Dry. TD 2,510 ft.

Runnels County: E. K & E. M. Burt 2 C. B. Spill, J. R. Nunn Sur. 338. IP 289 BOPD, 20/64-in., 44°, pay 2,637 ft. TD 2,648 ft.

G. B. Cree 1 J. P. McCord, Sec. 127, ETRR. Dry. TD 4,120 ft.

Fidelity Oil & Royalty Co. 1 M. H. Vancil, Sec. 26, H&GN. Dry. TD 4,800 ft.

Southern California Petroleum Co. 1 Joe Sanger, Wharton CSL 509, A-499. Dry. TD 4,375 ft., elev. 1,920 ft. Gray 4,290 ft.

Schleicher County: C. L. Norsworthy 1 Mary McBurnett, 2-L-GH&SA. Dry. TD 6,415 ft., elev. 2,335 ft., Palo Pinto 4,868 ft.

Renwar Oil Corp. and Delta Gulf Drilling Co. 1 D. E. DeLong, Sec. 52, Blk. TT. Dry. TD 7,742 ft., elev. 2,520 ft., Strawn 7,388 ft.

Sutton County: Sinclair Oil & Gas Co. 1 Rose Thorp, 2-A1543-GC&SF. Dry. TD 7,803 ft., elev. 2,328 ft., Ellenburger 7,640 ft.

Tom Green County: Amerada Petroleum Corp. 3 Joan Denis, Sec. 175, SPRR. Dry. TD 4,243 ft., elev. 1,988 ft., Strawn 4,156 ft.

Upton County: C. H. Sweet 1 G. B. McCamey, Sec. 4, Rusk Transportation Co. Sur. Dry. TD 2,123 ft.

The Texas Co. 1 Josephine Herbert Graf, 102-D-CCSD&RGNG. IP 544 BOPD, 58°, Strawn 9,828-43 ft. TD 12,645 ft., PB 9,944 ft. Elev. 2,820 ft., Strawn 9,775 ft.

Winkler County: Sun Oil Co. 1 Willie D. Amburgey, 11-B9-PSL. Dry. TD 6,300 ft.

SOUTHEAST NEW MEXICO

Curry County: Union Production Co. 1 Jones, 18-5n-37e. Dry. TD 8,180 ft., elev. 4,239 ft., Clear Fork 4,348 ft., Abo 5,570 ft., Wolfcamp 6,430 ft.

Lea County: Sinclair Oil & Gas Co. 1 State 250, 3-14s-33e. Dry. TD 10,000 ft., elev. 4,242 ft., Pennsylvanian 9,220 ft.

ILLINOIS

Clay County: The Texas Co. 1 Krutsinger, NE SW SW 11-3n-5e. Dry. TD 3,004 ft.

Edgar County: Ernest Zink 1 Honnole, NW SE NE 35-14n-14w. Dry. TD 430 ft.

Jefferson County: R. J. Sipoha 1 DeWitt, SW SW NW 23-2s-4e. Dry. TD 3,140 ft.

Macoupin County: D. Gerhardt 1 Launer, NW SE NW 23-12n-8w. Dry. TD 1,390 ft.

Madison County: T. S. Doran 1 Daiber, SW SW SW 21-4n-5w. Dry. TD 2,789 ft.

Richland County: Ashland Oil & Refining Co. 1 Arnold, NW NW NW 24-2n-10e. Dry. TD 3,340 ft.

W. W. Willis 1 Powell, NE NE SE 10-3n-10e. Dry. TD 3,231 ft.

Calvert Drilling Co. 1 Redman, 18-3n-10e. Dry. TD 3,160 ft.

Saline County: Pure Oil Co. 1 Garner, NE NE NW 35-7s-7e. Dry. TD 3,150 ft.

Wabash County: Columbus Exploration Co. 1 Seitz, SW SW NE 33-1n-13w. Dry. TD 2,014 ft.

Herndon Drilling Co. 1 Higgins, SW SW NW 35-2n-14w. Dry. TD 3,013 ft.

Washington County: Walter Duncan 1 Schnilker, SW SW NE 24-1s-2w. Dry. TD 3,163 ft.

Dale Hopkins 1 Kult, NE NE SW 35-2s-2w. Dry. TD 1,470 ft.

Carter Oil Co. 1 Krughoff, NW NW NE 18-2s-2w. Dry. TD 1,779 ft.

Wayne County: N. V. Duncan 1 Chas. Greathouse, SW NW NE 35-1n-5e. Dry. TD 3,126 ft.

White County: Coy Oil Co. 1 Schumaker, NE SE SE 15-4s-9e. Dry. TD 3,361 ft.

INDIANA

Dubois County: Dennison-Godwin 1 Rothert, SE NE SE 11-3s-6w. Dry. TD 1,200 ft.

Gibson County: K & H Drilling Co. 1 Lineburger, NE NE NW 28-3s-11w. Dry. TD 2,182 ft.

Knox County: Graham Development Co. 1 E. Oliver, Location 3-2n-9w. Dry. TD 1,844 ft.

WILDCAT COMPLETIONS

Posey County: V. R. Gallagher 1 Kifer, NW SW NE 35-4s-13w. Dry. TD 2,215 ft.

Spencer County: N. N. Nichols 1 O. Hein, NE NE NW 5-4s-5w. Dry. TD 1,100 ft.

Day & Ward 1 J. L. Garrett, SW NE SE 33-7s-6w. Dry. TD 1,263 ft.

Sullivan County: George Parmley 1 B. W. Pogue, NW SW NE 28-9n-10w. Dry. TD 2,535 ft.

Vigo County: T & H Corp. 1 Wheeler, SE SE NE 10-11n-8w. Dry. TD 1,717 ft.

KENTUCKY

Henderson County: Aakle & Holder 1 Pritchett-King, NE NE SW 25-P-22. Dry. TD 2,720 ft.

Union County: Ryan Oil Co. 1 Buchanan, SW SW SW 2-O-18. Dry. TD 3,077 ft.

Webster County: George A. Hoffman 1 Palmer Bros., SE NW NE 23-L-21. Dry. TD 2,484 ft.

MICHIGAN

Otsego County: Sun Oil Co. 1 Kneeland-Bigelow Trustee, NW NW NW 9-29n-4w. Dry. TD 2,487 ft. in Dundee.

St. Clair County: Arnott Sime 1 Hillock, NE NW NE 7-18n-17e. Dry. TD 895 ft. in Dundee.

Van Buren County: Norman L. Stevens 1 Puckett, SE SW SE 19-1s-15w. Dry. TD 1,118 ft. in Traverse lime.

WEST VIRGINIA

Webster County, Glade district: Wright Gas Co. 1 Alvin Wright. Dry. Maxon sand 1,428-1,495 ft. Show gas 1,441 ft. Tested 37,000 cu. ft., and blew out, TD 1,682 ft.

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WILDCAT COMPLETIONS

FLORIDA

Santa Rosa County: California Co. 1 Berrydall unit, C SW SE 4-4n-27w. Dry. TD 6,367 ft. Elev. 139 ft., Chalk 3,390 ft., Eutaw 5,100 ft., lower Tuscaloosa 5,983 ft., Massive 6,092 ft., lower Cretaceous 6,305 ft.

ALABAMA

Baldwin County: Stanolind Oil & Gas Co. 1 U. S. Steel, C SW SW 5-4s-3e. Dry. TD 7,998 ft. Elev. 224 ft., Wilcox 2,555 ft., Chalk 5,019 ft., Eutaw sand 6,565 ft., marine Tuscaloosa 7,100 ft., lower Tuscaloosa 7,508 ft., Massive 7,616 ft.

Monroe County: I. P. and Fred La Rue 1 Wright, C NW NE 18-9n-11e. Dry. TD 3,520 ft. Elev. 420 ft., Chalk 915 ft., Eutaw 2,165 ft., lower Tuscaloosa 3,314 ft.

MISSISSIPPI

Adams County: John S. Callon 1 R. Lee Parker est., 8-7n-2w. Dry. TD 6,501 ft. Elev. 183 ft., Sparta 2,773 ft., Wilcox 3,992 ft., base Big shale 5,295 ft., base Baker shale 5,799 ft.

Amite County: Calto Oil Co. 2-A Crosby, 16-4n-1e. Dry. TD 7,264 ft. Elev. 203 ft., Sparta 3,719 ft., Wilcox 4,781 ft., base Big shale 6,064 ft., base Baker shale 6,533 ft.

Franklin County: Durbin Bond & Co., Inc., 1 Central, near C NE NW 39-6n-2e. Dry. TD 6,859 ft. Elev. 269 ft., Vicksburg 2,168 ft., Sparta 3,209 ft., Wilcox 4,346 ft., base Big shale 5,676 ft., base Baker shale 6,131 ft.

Itawamba County: Walter E. Sistrunk 1 Gilmore Puckett, 10-11s-8e. Dry. TD 1,852 ft. Elev. 350 ft., Iowa 1,830 ft.

Jefferson County: Vasser-Fortenberry 1 J. H. Williams est., 82-9n-1w. Dry. TD 6,513 ft. Elev. 111 ft., Sparta 2,294 ft., Wilcox 3,605 ft., base Big shale 4,966 ft., base Baker shale 5,429 ft.

Wilkinson County: Gulf Refining Co. 31 Crosby, 31-3n-1e. IP 107 BOPD, 10/64-in,. 33.2°, Wilcox 7,088-94 ft. (casing perforations). TD 7,700 ft. Elev. 340 ft. Vicksburg 3,688 ft., Sparta 4,588 ft., Wilcox 5,585 ft., base Big shale 6,043 ft., base Baker shale 7,343 ft. (New field—Saukum.)

SOUTH LOUISIANA

Beauregard Parish: Chicago Petroleum Co. 1 Fuller est., 4-3s-12w. Dry. TD 10,001 ft.

Cameron Parish: Superior Oil Co. 1 State Lease 2039, 23-16s-3w. IP 110 BCPD, with 8,450 M.c.f. daily, 22/64-in., 45.7°, casing perforations 14,000-20 ft. TD 14,542 ft. (New field in Rockefeller Game Reserve.)

East Baton Rouge Parish: Atlantic Refining Co. 1 Louisiana State University, 42-7s-1e. Dry. TD 11,005 ft.

Lafourche Parish: Union Producing Co. 1-B Delta, 35-16s-18e. Dry. TD 12,525 ft.

Plaquemines Parish: California Co. 1 Plaquemines Oil & Development Co. et al, Township 24s-31e, in Southwest Pass. IP 201 BOPD, 10/64-in., 31.7°, casing perforations 8,280-8,310 ft. TD 10,993 ft. (New pay in Southwest Pass field.)

St. Bernard Parish: Continental Oil Co. et at 1 State Lease 1828, Township 16s-17e, in Lake Fortuna. Dry. 10,525 ft.

Terrebonne Parish: Superior Oil Co. 1-A LaTerre 2-19s-13e. IP 137 BOPD, 8/64-in., 39.6°, casing perforations 11,616-21 ft. TD 14,434 ft. (New pay in Bayou Penchant field.)

Vermilion Parish: Union Oil Co. of California 1 State Lease 2119, in White Lake (West White Lake area). Dry. TD 12,520 ft.

NORTH LOUISIANA

Grant Parish: Bates & Cornell Co. 1 Fletcher, C SW NW SE 9-7n-4w. IPF 66 BOPD, 46.8°, Wilcox 4,290-4,300 ft. TD 5,579 ft. (Discovery - tentatively called Aloha.)

Natchitoches Parish: Fort Bend Oil Co. 1 Dunkleman, 3,076 ft. S and 800 ft. E of NWc of irregular Sec. 27-10n-6w. Dry. TD 5,801 ft.

ARKANSAS

Dallas County: H. M. Mills et al. 1 Sparkman-Horne, C NW NE NE 16-10s-17w. Dry. TD 2,000 ft. Paleozoic 1,790 ft.

OKLAHOMA

Cimarron County: Cities Service Oil Co. 1 Ferguson "C," SE SE NW 35-5n-9eCM. IP 33,850 M.c.f. of gas per day, Keys 4,556-90 ft. TD 4,689 ft.

Cities Service 1 Mingenbach, SE SE NW 32-6n-9eCM. IP 6,680 M.c.f. of gas per day, Keys 4,534-74 ft. TD 4,750 ft.

Comanche County: Wm. H. Atkinson 1-A Ingram, SW NW NW NE 28-4n-11w. Dry. TD 132 ft.

Creek County: Clark & Cowden Producing Co. 1 W. Bell Est., SE NE NW 19-16n-8e. Dry. TD 3,827 ft.

Gulf Coast Western 1 Hayden Ranch "B," SE NE NW 11-19n-9e. IPF 96 BOPD, Dutcher 2,385-94 ft. TD 2,394 ft. (New pay at East Mannford.)

THE OIL AND GAS JOURNAL

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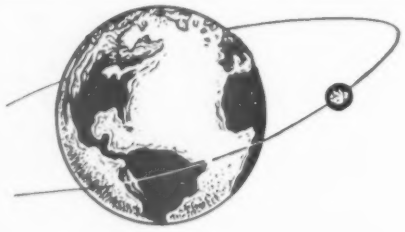

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Hughes County: Hogan & Lortscher 1 Patricia, NW NW SE 21-5n-9e. Dry. TD 1,281 ft.

Hogan & Lortscher 2 Patricia, SE SE SE 21-5n-9e. Dry. TD 2,875 ft.

Kay County: Chas. L. Jenkins 1 Gingerich, SE SE NE 34-27n-1e. IPF 75 BOPD, Cleveland sand 3,218 ft. TD 4,081 ft. (New pay at new pool.)

Gross Drilling Co. 1 Goberson, NE NE NE 8-27n-3e. Dry. TD 3,410 ft.

Gross Drilling Co. 2 Huster, NE NW SE 14-29n-3e. Dry. TD 3,237 ft.

Birmingham-Bartlett Drilling Co. 1 Miller, SW NW NW 18-29n-1w. Dry. TD 4,014 ft.

Kiowa County: Huffman & Malloy 1 Eaton, NE NW SW 14-6n-14w. Dry. TD 682 ft.

Lincoln County: McElreath, Harvey and Wagner 2 Walter Criess "C," NE NE SW 34-15n-6e. Dry. TD 4,498 ft.

Sooner State Oil Co., Inc. 1 Gibson, NW NW SE 13-16n-5e. Dry. TD 4,215 ft.

Logan County: Arrow Drilling Co. 1 State School Land, SE SE SE 36-16n-1e. Dry. TD 5,303 ft.

McIntosh County: Palmer Oil Corp. 1 Lasley, NW NW SE 19-10n-15e. Dry. TD 3,999 ft.

Marshall County: Capitol Hill Oil Corp. 1 Williams, SW SW NW 20-6s-6e. Dry. TD 7,103 ft.

Murray County: Mack Oil Co. and C. A. Caswell 1 Freeman Est., NW NW SW 25-1s-2e. Dry. TD 3,510 ft.

Pawnee County: Jernigan & Morgan Oil Co. 1 DeWitt, SE SW NE 23-20n-5e. Dry. TD 3,771 ft.

Pontotoc County: J. Marvin Boyd 1 Smith-Beck, NE SW SW 9-3n-6e. Dry. TD 1,807 ft.

Seminole County: Russell B. Patterson 1 Lyon, NW NE NE 9-5n-7e. Dry. TD 3,143 ft.

Stephens County: Texas Pacific Coal & Oil Co. 2 Herndon, NW NE NE 2-4s-5w. Dry. TD 3,057 ft.

Texas County: Cities Service 1-A Hicks "C," NE NE SW 19-6n-10eCM. Dry. TD 3,647 ft.

KANSAS

Cowley County: Laura Jane Oil Co.-Lindas Oil Co. 1 Alspaugh, SW SW SE 34-32s-4e. Dry. TD 3,092 ft.

Laura Jane Oil Co. 1 Hornbeck, SE SE NW 5-33s-4e. IPF 234 BOPD, Bartlesville 3,173-89 ft. TD 3,189 ft.

Decatur County: Sauvage & Dunn 1 Sauvage, SW SW NW 16-2s-29w. Dry. TD 4,206 ft.

Ellis County: National Cooperative 1 Erbert, NW NW NW 20-12s-20w. IPP 146 BOPD, Lansing-Kansas City 3,727-34 ft. TD 3,928 ft. (Opens Erbert pool.)

National Cooperative 1 Flax, NW NW SE 1-13s-20w. Dry. TD 3,921 ft.

Lindas 1 Kansas State, SW SW NW 16-14s-18w. Dry. TD 3,705 ft.

Musgrove 2 Hauschild, NW NW SW 16-15s-19w. Dry. TD 3,644 ft.

D. R. Lauck 1 Werth, SE SE SE 19-15s-19w. Dry. TD 3,747 ft.

Jones, Shelburne & Farmer 1 Foster, SE SE SW 7-15s-20w. Dry. TD 3,940 ft.

Graham County: Strain 1 Thompson, SW SE NE 2-9s-22w. Dry. TD 3,841 ft.

Harvey County: Graham-Messman-Rinehart 1 Baud, SW SW SW 34-24s-3w. Dry. TD 4,036 ft.

Jackson County: H. Buhler and T. Lutz 1 Blumberg, C NW NW 6-8s-16e. Dry. TD 3,244 ft.

Marion County: K. T. Wiedemann 1 Pinkard, SW SW SE 29-22s-4e. Dry. TD 2,553 ft.

Norton County: Jones, Shelburne & Farmer 1 Lawson, SE SE NW 36-3s-24w. IPP 200 BOPD, Arbuckle 3,779-90 ft. TD 3,790 ft. (Opens Columbia pool.)

Pawnee County: Westgate-Greeland Oil Co. 1 Koelsch, SE NE NW 33-22s-15w. IPP 141 BOPD, Lansing-Kansas City 3,728-36 ft. TD 4,098 ft. (Opens Dunes Southwest pool.)

Rice County: E. H. Riggs 1 Sellers, NE NE NE 25-18s-7w. Dry. TD 3,515 ft.

Scott County: Continental Oil Co. 1 Thon, NW NW NW 26-16s-31w. Dry. TD 4,832 ft. Mississippian 4,646 ft.

Stafford County: Walters 1 Cornwell, NW NW NW 18-23s-12w. Dry. TD 3,910 ft.

NEBRASKA

Banner County: D. M. Love Associates 1 Olsen, NW NE SE 5-17n-56w. Dry. TD 6,698 ft. Skull Creek 6,689 ft.

Cherry County: Sand Hills Drilling Co. 1 Boorman Cattle Co., NE NW SW 5-33n-27w. Dry. TD 3,229 ft. Granite 3,138 ft.

Cheyenne County: Ohio Oil Co. 1 Hill, SE NE NW 30-13n-50w. IP 3,500 M.c.f. of gas per day, "J" sand 4,984 ft. TD 5,075 ft. ("D" sand gas discovery, new field.)

Kimball County: Vaughey & Vaughey, Rogers Oil Co., E. J. Brock 1 Durland Trust, SW SW NE 15-14n-56w. IPP 68 BOPD, "J" sand 6,541 ft. TD 6,625 ft. ("J" sand discovery, new field.)

Rex Monohan 1 Dillion, NW NW NW 18-12n-55w. Dry. TD 6,577 ft.

Lincoln County: Denton et al. 1 Boyle, SW SW SW 28-15n-32w. Dry. TD 3,500 ft.

Denton et al. 1 Hanse, NW NW NW 36-15n-31w. Dry. TD 3,527 ft.

NORTH DAKOTA

McKenzie County: Amerada Petroleum Corp. 1 N. D. "R", C SW SW 16-150n-95w. Dry. TD 9,338 ft. Madison 8,937 ft.

SOUTH DAKOTA

Haakon County: Kerr-McGee Oil Industries,

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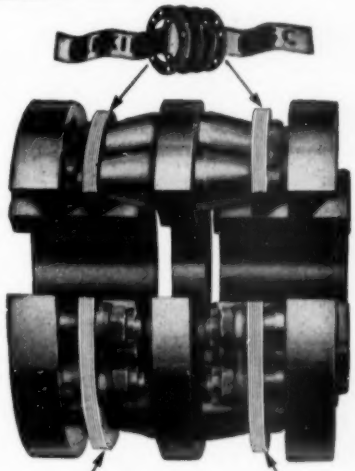

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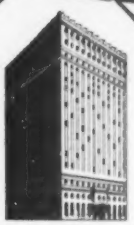
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WILDCAT COMPLETIONS

Inc. 1 Fred Chute, C SW SW 33-3n-19e. Dry. TD 5,486 ft. Pre-Cambrian 5,440 ft.

CALIFORNIA

Colusa County: Humble Oil & Refining Co. 1 Capital Co., 28-16n-1w. Dry. TD 3,551 ft.

Los Angeles County: W. J. Dennis 1 Steele, 36-1n-18w. Dry. TD 5,300 ft., deepened from 2,572 ft. to 5,300 ft.

Intex Oil Co. 2 Cleeves, 33-3n-14w. Dry. Granite 1,505 ft. TD 1,540 ft.

Dielectric Laboratories, Inc. 2 Radin, 30-2s-9w. Dry. TD 1,116 ft.

Porter Sexnon et al. 52-15 Greenman Community, 15-2n-16w. Dry. TD 6,152 ft.

Monterey County: J. C. Kimble, Opr. 1 Jensen-McNee, 21-24s-12e. Dry. TD 4,655 ft.

Orange County: J. Sandburg and L. D. Carlson 1 Segerstrom, 9-6s-10w. Dry. TD 6,555 ft.

The Texas Co. 2 Travis, 30-3s-8w. Dry. TD 3,621 ft.

San Benito County: Tide Water Associated Oil Co. 1 Eyre, 6-14s-6e. Dry. TD 7,741 ft.

San Luis Obispo County: Hamilton & Sherman 1 Lehnhoff, 26-27s-12e. Dry. TD 5,002 ft.

Ventura County: Standard Oil Co. 113-18 McGrath, 26-2n-23w. Dry. TD 9,886 ft.

WASHINGTON

Lewis County: Standard Oil Co. 1 Seifert, 4-14n-3w. Dry. TD 4,020 ft.

MONTANA

Big Horn County: Shell Oil Co. 4 Crow, NE NE SW 26-9s-37e. Dry. TD 4,950 ft. Ash Creek 4,616 ft.

Liberty County: Chief Exploration Co. 1 Ben Graw, C NE NE 24-33n-4e. Dry. TD 2,595 ft. Temporarily abandoned. Madison 2,554 ft.

Musselshell County: Wm. M. Hanlon 1 Hanlon Moncana, NW SE NE 9-10n-22e. Dry. TD 4,338 ft. Cambrian 4,312 ft.

Roosevelt County: Carter Oil Co. 1 R. W. Lowe, C NW SE 13-28n-50e. Dry. TD 6,625 ft. Lodgepole 6,480 ft. (?).

NEVADA

Elko County: Weston Osage Oil, Inc., 1 Government, NE NE NW 23-31n-69e. Dry. TD 1,327 ft.

WYOMING

Big Horn County: L. J. Peterson et al. 1 Government, C SW NE 2-49n-92w. IPF 960 BOPD, 3/8-in. in 5 hours, Phosphoria 5,768 ft. TD 5,859 ft. (Phosphoria discovery, new field.)

Fremont County: Superior Oil Co. 2 Unit, NE SE SW 10-31n-98w. Dry. TD 2,197 ft. Tensleep 2,166 ft.

COLORADO

Adams County: Triangle "J" Oil Co. 1 Morris, NE NE SW 27-2s-57w. IPP 240 BOPD, "D" sand 5,381 ft. TD 5,435 ft. ("D" sand discovery, new field.)

Larimer County: Al Ward and Tuley & Carter 1 Jaerger, SE NW NW 26-10n-69w. Dry. TD 3,651 ft. Morrison 3,641 ft.

Logan County: British-American Producing Co. 1 Monroe-Rieke, SW NE SE 1-8n-54w. IPP 83 BOPD, "J" sand 5,054 ft. TD 5,140 ft. ("J" sand discovery, new field.)

British-American 2 Monroe-Rieke, SW SE SE 1-8n-54w. IPP 100 BOPD, TD 5,156 ft. ("D" sand discovery, new pay.)

Eisenhower Drilling Co. 1 Force, SE NW NW 15-7n-54w. Dry. TD 5,185 ft.

Ryan Oil Co. and Miracle & Fifer 1-A State, C SW NE 16-9n-53w. Dry. TD 4,989 ft.

British-American 1-"D" Otto Yenter, NW NW NE 15-9n-54w. Dry. TD 5,314 ft.

Morgan County: Sunbeam Oil (Eddie Fisher) and Reco Oil Co. 1 Pettys, SE SE NE 30-2n-55w. Dry. TD 5,210 ft.

Plains Exploration and Dunn & Boreing 1 Chapman, SE SE SE 12-4n-55w. Dry. TD 5,166 ft.

Northern Drilling & Production 1 Chartier, NE SE SE 14-4n-56w. Dry. TD 5,339 ft.

Washington County: National Associated Petroleum Co. 1 Stormberg, NW NE NE 22-4s-54w. Dry. TD 4,973 ft.

SASKATCHEWAN

Anglo American-Gridoil 6-13 Gull Lake, LSD 6, 13-13-19w3. Blairmore and Jurassic oil well. TD 4,000 ft.

Amurex 1-9 Melrose, LSD 9, 5-13-25w3. Dry. TD 3,682 ft.

Socony-J. P. Owens 1 East Peepeekeesis, LSD 3, 6-22-10w2. Dry. TD 4,110 ft.

ALBERTA

Sun-Great Plains-Stanolind et al. 1-25 Coolidge, LSD 1, 25-64-25w4. Dry. TD 3,450 ft.

Amurex 2-6 Denhart, LSD 6, 21-20-19w4. Dry. TD 3,430 ft.

Marwayne 6-31 Ranchmen's, LSD 6, 31-35-9w4. Viking oil well, new pool. TD 3,025 ft.

Husky 2 Islay, LSD 1, 17-51-4w4. Dry. TD 2,082 ft.

Canadian 10-4-4-12 Montana Well, LSD 10, 4-4-12w4. Dry. TD 3,143 ft.

Texas Calgary 1 Rolling Hills, LSD 9, 22-14-13w4. Dry. TD 4,200 ft.

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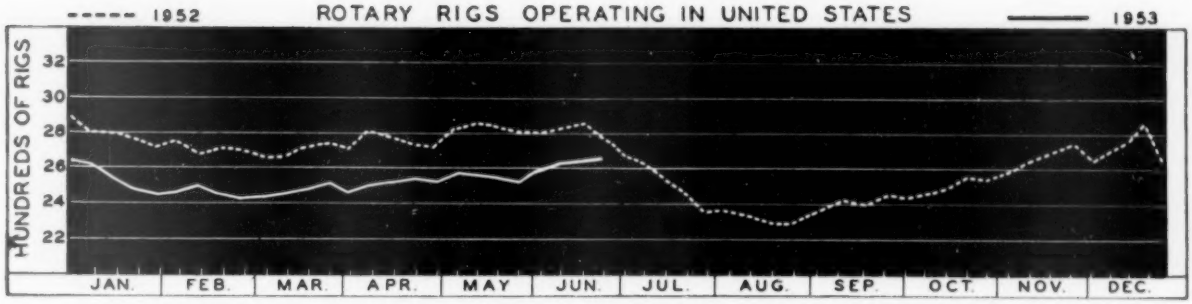
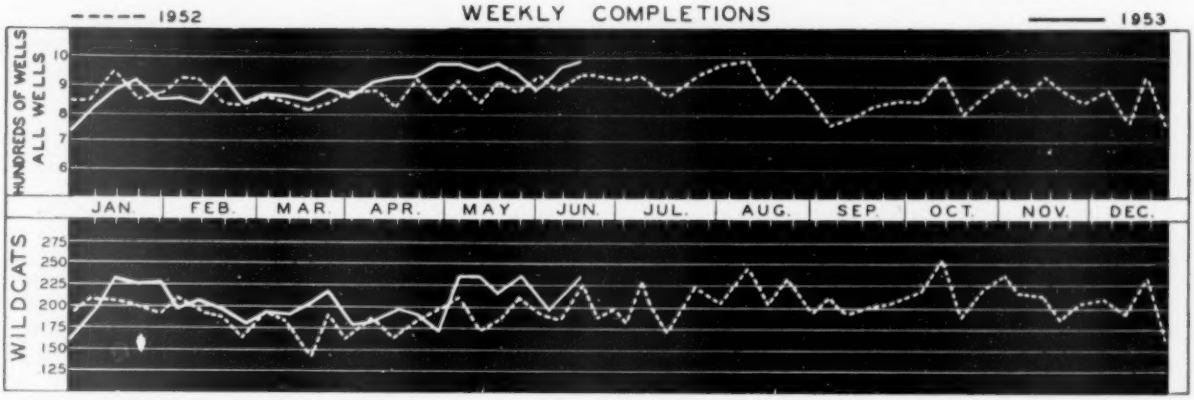




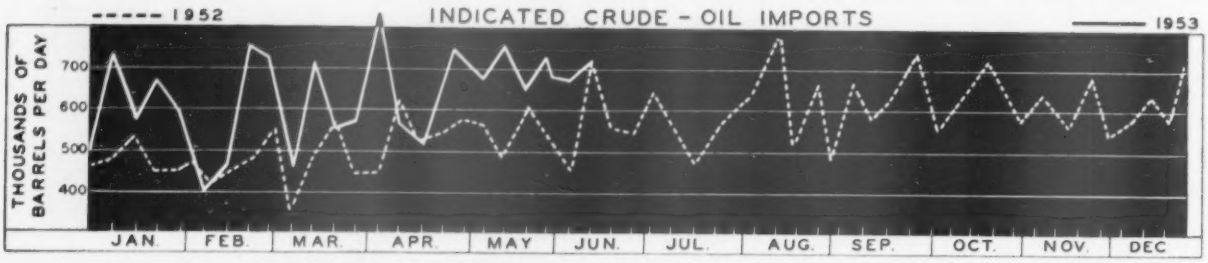
CURRENT STATISTICS

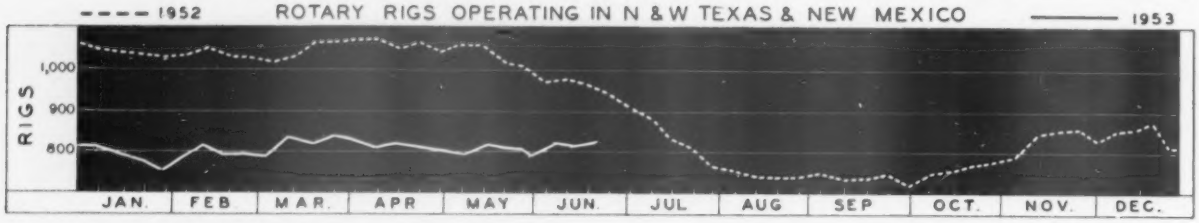
EXPLORATION

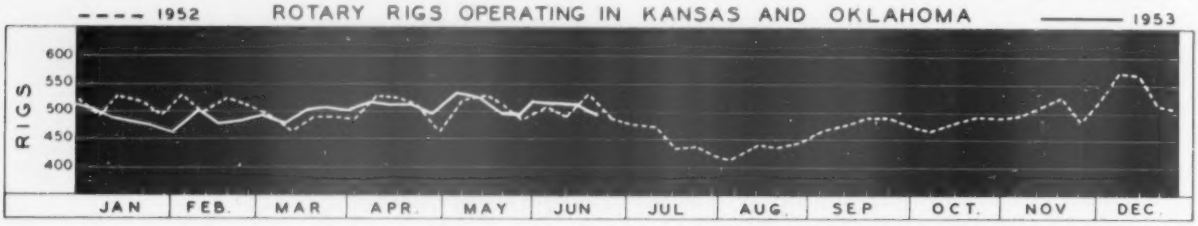
WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 20, 1953

	Total of all wells					June 20		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	21,600	320	369	0	0	0	0	0	0	0	0	0	0
Pennsylvania	32	17	3	†12	55,450	790	816	0	0	0	0	0	0	0	3	8	11
West Virginia	4	0	2	2	10,072	271	287	0	0	0	1	1	0	0	4	3	7
Ohio	23	13	6	‡4	53,378	463	469	0	0	0	0	0	1	0	1	10	12
Indiana	19	7	0	12	33,008	552	540	0	0	0	8	8	8	0	2	137	147
Kentucky	18	8	0	10	41,247	488	621	0	0	0	3	3	5	0	0	88	93
Illinois	47	18	1	28	115,676	819	778	0	0	0	16	16	3	0	0	173	176
Michigan	9	4	0	5	25,898	248	320	0	0	0	3	3	8	0	4	96	108
Kansas	110	58	8	§44	374,221	2,315	2,234	4	0	0	14	18	55	0	19	362	436
Nebraska	12	6	1	5	63,886	148	110	1	0	1	5	7	12	0	2	65	79
Oklahoma	157	97	5	‡55	487,200	3,338	2,795	2	0	2	19	23	54	4	15	303	376
Texas	353	202	15	136	1,672,414	8,042	8,626	20	2	2	79	103	411	30	93	1,949	2,483
North Central (Dist. 7-B & 9)	117	66	2	49	438,216	2,926	2,722	16	0	1	23	40	219	0	10	779	1,008
West (Dist. 7-C & 8)	85	64	1	20	455,504	1,762	2,693	2	0	0	13	15	78	2	6	307	393
Panhandle (Dist. 10)	18	13	5	0	62,989	386	312	0	0	0	0	0	0	2	0	14	16
Eastern (Dist. 5 & 6)	10	3	1	6	45,567	383	429	0	0	0	3	3	12	2	3	131	148
Gulf Coast (Dist. 2 & 3)	51	20	3	28	313,491	1,199	1,275	0	1	0	18	19	53	9	40	310	412
Southwest (Dist. 1 & 4)	72	36	3	33	356,647	1,386	1,195	2	1	1	22	26	49	15	34	408	506
Louisiana	49	30	1	18	361,843	1,164	1,060	3	1	0	6	10	31	13	11	157	212
Northern	19	14	0	5	59,168	459	558	1	0	0	1	2	3	1	2	56	62
Southern	30	16	1	13	302,675	705	502	2	1	0	5	8	28	12	9	101	150
Arkansas	4	1	0	3	11,798	201	181	0	0	0	1	1	5	0	0	39	44
Mississippi	11	3	0	8	68,640	169	175	1	0	0	5	6	9	0	3	80	92
Southeastern States	4	0	0	4	24,489	66	27	0	0	0	3	3	1	0	0	50	51
Montana	9	4	0	5	33,726	171	106	0	0	0	4	4	3	0	0	43	46
Wyoming	9	6	0	3	43,729	278	303	1	0	0	1	2	9	0	0	43	52
Colorado	19	6	3	10	89,259	258	187	3	0	0	8	11	13	0	8	123	144
Utah	0	0	0	0	0	34	30	0	0	0	0	0	2	0	0	22	24
New Mexico	34	11	16	7	188,527	617	474	0	0	1	2	3	8	0	7	57	72
California	49	36	0	13	226,147	1,208	1,191	0	0	0	11	11	26	0	3	274	303
North Dakota	4	3	0	1	34,760	116	18	0	0	0	1	1	3	0	0	21	24
Misc. (Tenn., Wash., Nev., S. D.)	5	1	0	4	12,660	26	38	0	0	0	4	4	1	0	0	21	22
Total United States	995	538	61	396	4,049,628	22,102	21,755	35	3	6	194	238	668	47	175	4,124	5,014
Total previous week	975	528	57	390	3,957,001			27	4	3	178	212	633	44	169	3,930	4,776
Total June 21, 1952	937	513	60	364	3,783,254			21	0	2	160	183	666	48	114	3,820	4,648

Service wells included: *7, †11, ‡1, §2.



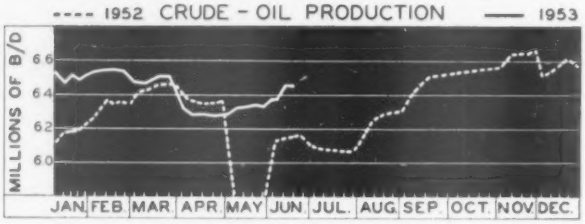


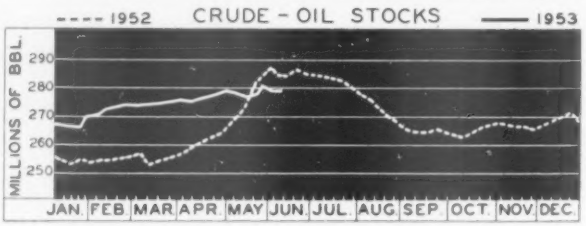


DAILY AVERAGE PRODUCTION FOR WEEK

	June 20 Crude oil	June 20 Lease condensate	June 20 Total	June 13 total
Alabama	5,000		5,000	5,100
Arkansas	77,150	600	77,750	77,300
California	1,016,100		1,016,100	1,015,500
Colorado	102,500		102,500	100,000
Eastern	58,900		58,900	58,800
Florida	1,450		1,450	1,450
Illinois	163,600		163,600	159,700
Indiana	35,900		35,900	35,700
Kansas	324,200		324,200	341,800
Kentucky	30,400		30,400	30,200
Louisiana	665,250	37,800	703,050	702,650
North	110,900	2,800	113,700	113,300
South	554,350	35,000	589,350	589,350
Michigan	34,300		34,300	34,400
Mississippi	93,500	4,200	97,700	98,650
Montana	31,000		31,000	30,400
Nebraska	13,700		13,700	13,900
New Mexico	194,975	950	195,925	196,025
Oklahoma	532,700		532,700	530,400
Texas	2,760,825	44,525	2,805,350	2,805,350
Dist. 1	36,300	400	36,700	36,700
Dist. 2	153,800	5,850	159,650	159,650
Dist. 3	447,175	22,700	469,875	469,875
Dist. 4	258,950	5,650	264,600	264,600
Dist. 5	48,750	350	49,100	49,100
Dist. 6	121,475	5,200	126,675	126,675
East Texas field	253,000		253,000	253,000
Dist. 7-B	115,900	50	115,950	115,950
Dist. 7-C	162,075	3,650	165,725	165,725
Dist. 8	910,800	200	911,000	911,000
Dist. 9	177,500	450	177,950	177,950
Dist. 10	75,100	25	75,125	75,125
Utah	5,300		5,300	5,400
Wyoming	210,500		210,500	210,900
North Dakota	14,600		14,600	14,700
Total U. S.	6,271,850	88,075	6,459,925	6,468,325
Change from previous week, down			8,400	
Canada	242,550		242,550	202,400
Total U. S. production January 1-June 20			1,098,703,450 bbl.	
Same period last year (crude plus cond.)			*1,050,496,675 bbl.	

*Includes 15,248,485 bbl. condensate.



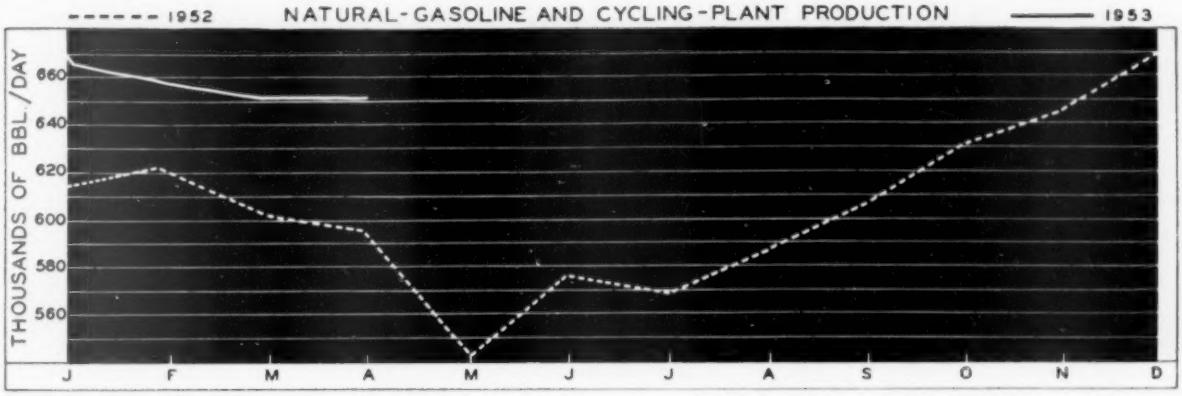


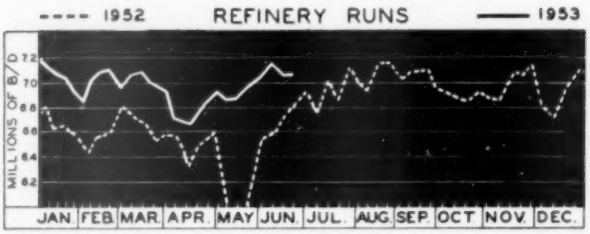
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

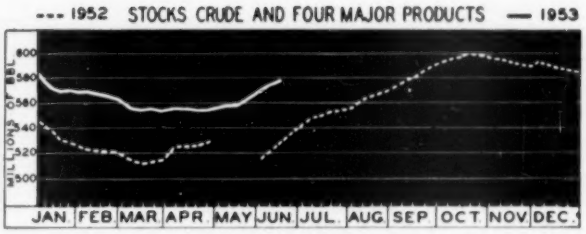
(Thousands of barrels)

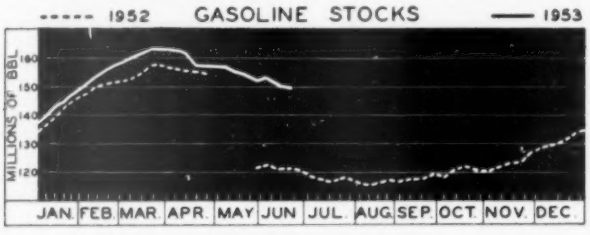
	June 13, '53	June 6, '53	June 14, '52
Pennsylvania Grade	2,640	2,631	2,564
Other Appalachian	2,293	2,236	2,090
Illinois, Indiana, Michigan	11,858	11,882	13,063
Arkansas	2,697	2,836	3,223
Louisiana	15,828	15,507	15,327
North	2,585	2,527	2,768
Gulf	13,243	12,980	12,559
Mississippi	3,752	4,007	2,959
New Mexico	7,198	7,131	7,741
Oklahoma and Kansas	39,462	39,566	42,804
Texas	132,398	131,047	141,090
East Texas proper	11,158	11,445	14,335
West Texas	62,189	61,643	60,403
Texas Gulf	26,335	25,978	31,267
Other Texas	32,716	31,981	35,085
Rocky Mountain	17,639	17,905	15,233
California	32,461	32,841	30,240
Foreign	†10,734	10,318	8,572
Total	278,960	277,907	284,906

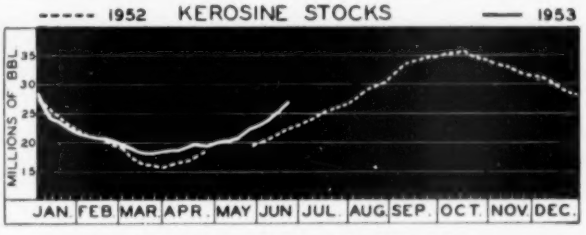
*Bureau of Mines. †Includes 2,096,000 bbl. in California.

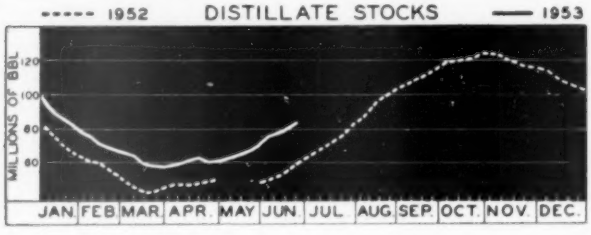


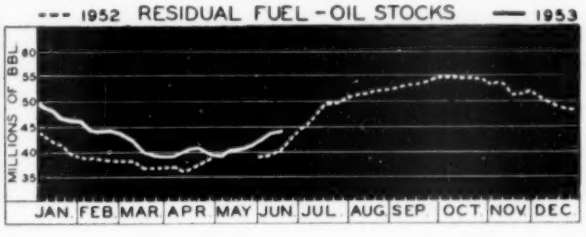










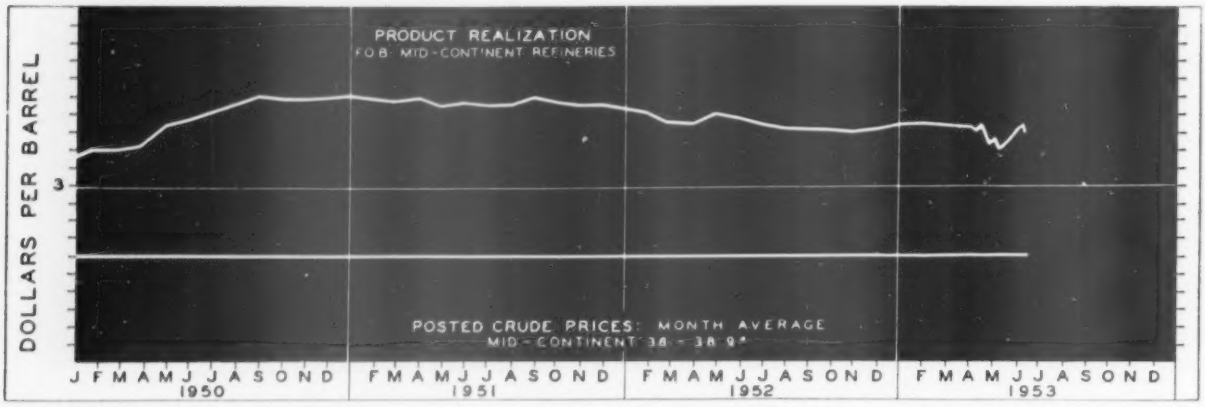


A.P.I. REFINERY REPORT, JUNE 20

(Thousands of barrels)

District	Daily avg. runs	Daily average production — Gaso.*	Kero.	Dist.	Resid.	Stocks† — Gaso.‡	Kero.	Dist.	Resid.	Bureau of Mines, June 1952 — Daily avg. runs	Daily average production — Gaso.*	Kero.	Dist.	Resid.
East Coast	1,054	425.7	42.1	225.3	226.3	33,904	11,563	27,613	11,377	1,125	419.0	35.7	256.1	240.1
Appalachian:														
District 1	107	48.0	4.3	18.6	15.3	3,696	516	877	492	110	48.0	4.6	14.5	13.2
District 2	88	37.1	4.9	9.9	13.3	1,490	316	441	148	77	38.4	2.0	12.9	12.3
Ind., Ill., Ky.	1,234	666.3	67.8	215.0	168.8	29,845	5,070	12,632	3,490	1,240	659.8	67.5	230.8	156.4
Okla., Kans., Mo.	616	352.9	18.0	155.0	48.6	15,353	1,577	9,213	1,223	540	294.9	15.6	126.6	51.8
Inland Texas	278	159.9	11.6	49.0	39.1	6,045	487	1,444	1,219	271	171.9	11.1	44.8	41.2
Texas Gulf Coast	1,708	810.1	144.3	378.8	251.4	21,544	3,586	12,077	6,775	1,603	717.6	118.0	418.9	259.5
La. Gulf Coast	571	277.7	30.4	149.4	52.7	7,513	2,339	5,074	1,451	538	236.8	45.3	132.3	52.8
N. La. and Ark.	89	31.9	7.7	26.0	6.3	3,068	485	718	53	85	32.8	6.5	19.4	5.8
Rocky Mountain:														
New Mexico	20	12.1		3.0	3.9	199		35	30	18	10.9	.3	2.9	4.2
Other Rocky Mtn.	240	118.7	.3	61.1	42.0	6,457	247	1,973	1,023	235	110.8	6.3	45.1	40.9
California	1,058	422.7	7.3	152.0	375.3	20,421	744	10,604	16,656	983	428.3	4.4	150.4	349.4
June 20, 1953	7,063	3,363.1	338.7	*1,443.1	1,243.0	149,535	26,930	82,701	43,937	6,825	3,169.2	317.3	1,454.7	1,227.6
June 13, 1953	7,026	3,458.6	352.1	1,426.6	1,229.3	150,757	25,442	79,579	43,595					
June 21, 1952	6,805	3,179.7	311.3	1,484.1	1,227.9	121,613	21,865	60,905	42,822					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.31 for week ended June 13, $3.35 for previous week, and $3.39 for June 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of June 24, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	11⅜-11⅝	13-13.25	11.5-11.75
Premium gasoline	12⅜-12⅞	14.25-14.50	12.5-12.75
42-44 w.w. kerosine	9-9.25	10-10.65	9-9.5
No. 2 straw fuel oil	8-8.25	9-9.65	8-8.5
No. 6 residual	$1.00-1.10	$2.25-2.40	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.60	6.10	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12
750 vis., No. 3-4 neutral	15
2,000 No. 5-6 neutral	17

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19.5-20.5
200 vis., No. 3 neutral, 0-10 pp.	13

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	25.5
180 vis., 10 p.t. neutral	27.5

WAX

Mid-Continent

132-134 A.M.P.	6.0

REACTION of product prices to the crude price increase was still without a definite pattern 10 days after the first announcement of the crude increase.

On the East Coast, gasoline prices had increased about 0.5 cent a gallon in New York and New England a week before the crude increase. Since the crude increase was announced, tank-wagon prices advanced another 0.8 cent a gallon for a total increase of 1.3 cents. In the southern areas of the East Coast, gasoline prices are up slightly more than a cent a gallon.

In contrast with the increases in price of gasoline, light-heating-oil markets have been generally soft on the East Coast and some spot material is reported available at prices that have been in effect since the announcement of a summer allowance of 0.5 cent a gallon to promote movement to secondary and consumer storage.

Heavy fuel on the East Coast is up about 15 cents a barrel compared with an increase of 25 cents on the Gulf Coast. The differential is accounted for by the subnormal tanker rate.

In District 2, Standard Oil Co. (Ind.) raised tank-wagon prices for gasoline and heating oils in most of its marketing area. The gasoline increases ranged from a cent a gallon for Indiana and Illinois to 0.3 cent in the Dakotas.

The first announced increase in gasoline prices for the Mid-Continent was the 0.5 cent for premium only. This was later followed by general increases in gasoline prices ranging up to a cent a gallon. However, as late as June 24 prices had not settled to a uniform increase. Some independent refiners with local gasoline distribution were still selling premium at a cent over the price of regular at service stations. Others were using the old normal of 2 cents between regular and premium, and still others were selling premium at 2.5 cents more than regular.

Group 3 residual is up about 10 cents a barrel.

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87	....	....	....
15-15.9	1.93	....	....	....
16-16.9	1.99	....	....	....
17-17.9	2.05	....	....	....
18-18.9	2.11	....	....	....
19-19.9	2.18	....	....	....
20-20.9	2.24	$2.50	....	$2.37
21-21.9	2.30	2.52	....	2.39
22-22.9	2.37	2.54	....	2.41
23-23.9	2.45	2.56	....	2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9	....	2.76	3.09	2.63
34-34.9	....	2.78	3.11	2.65
35-35.9	....	2.80	3.13	2.67
36-36.9	....	2.82	3.15	2.69
37-37.9	....	2.84	3.17	2.71
38-38.9	....	2.86	3.19	2.73
39-39.9	....	2.88	3.21	2.75
40 and above	....	2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Prices after increase effective June 15, 1953. General increase was $0.25 but some Gulf Coast crudes were up $0.35.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Pecos County (Yates)	2.57
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.40
Southwest Pennsylvania	3.97
West Virginia	3.91
Illinois Basin	3.02

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EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Pressey & Son, Pueblo, Colorado.

FOR SALE

SUPERIOR HEAVY DUTY DIESEL

510 hp. at 360 r.p.m.—5 cylinder—14½x18 type ZDSB — non-reversing — vertical—4 cycle—cold starting—mechanical injection. Engine is totally enclosed. Complete with a 48" 7 groove V-belt sheave and new spare parts. For heavy duty pumping, dredge service, power generation, textile and saw mills, mining, etc. EXCELLENT CONDITION, IMMEDIATE DELIVERY.

G. M. 3-71 DIESEL GEN. SET

30 kw. 2 cylinder 4½x5 diesel—radiator cooled—electric starting. Delco 3/60/440 generator — with switchgear. Skid mounted. Portable.

30 KW SHEPPARD DIESEL SETS

30 kw. Sheppard—115 volts DC—radiator cooled . Built 1950. Excellent condition. Self-mounted radiator and fuel tank. 16 units available.

75 KW WAUKESHA DIESEL GENERATOR SET

75 kw.—230 volts DC—totally enclosed, self-contained. Waukesha 6 cyl., 160 hp., 1200 r.p.m. diesel driving 75 kw. 1200 r.p.m. G. M. marine type generator. Self-contained switchboard and radiator.

100 KW G. M. 3-268A A.C. DIESEL GENERATOR SETS

440 volts—3 phase—60 cycle. 20 kw. D.C. generator on same shaft—5 kw. exciter—120 volts D.C.—electric starting.

LORIMER SLOW SPEED 100 KW A.C. DIESEL GENERATOR SET

Slow speed heavy duty unit. 150 hp.—5 cyl.—4 cycle—720 r.p.m.—electric starting—Ross heat exchanger—engine operating panel. Allis-Chalmers generator—100 kw.—440/3/60—80% PF—cubicle deadfront switchgear. Can quote with radiator if desired.

300 KW G. M. D.C. DIESEL SET

ENGINE: G.M. 8-268A—6½x7—1200 r.p.m.—air starting. GENERATOR: 300 kw. G.E.—120/240 volts D.C.—3 wire—totally enclosed—Marine type BB—with switchgear.

ELECTRIC WINCHES

Single drum—50 hp. 230 volt D.C. motors—built-in controls.

STEAM TURBO-GENERATOR SETS

300 kw—120/240 volts D.C.—1200 r.p.m.—1250 amps.—turbine W.P., 225 lbs. to 440 lbs.

MARINE SURFACE CONDENSERS

1050 sq. ft.—3000 sq. ft.

THE BOSTON METALS CO.
313 E. BALTIMORE ST.
BALTIMORE 2, MARYLAND
CURTIS 7-5050

EQUIPMENT FOR SALE

DRILLING EQUIPMENT FOR SALE: Mud pumps, swivels, travelling blocks. This equipment is brand new and produced by a reliable manufacturer, and is offered for sale at reduced prices. Box G-523, The Oil and Gas Journal, Tulsa, Oklahoma.

ONE COMPLETE GM Quad in good running condition. Recently overhauled. 60 injectors. $3,800 FOB Seattle. Evans Engine & Equipment Co., 1230 Westlake North, Seattle.

USED ENGINES: 1—6—71 Twin GM diesel power unit complete with heavy duty gear case, API rating 276 HP at 1800. New appearance. Less than half of new price. 1—U-21 IHC gas or gasoline power unit. Completely rebuilt. Also have large inventory of used engines which can be rebuilt to your specifications. Mead Engine & Welding Works, Box 395, Sterling, Kansas.

FOR SALE: Bettis 40 hp. steamer and equipment. Arnold E. Fox, 4756 North Seneca, Wichita, Kansas.

ONE 80,000 BBL. TANK, good condition, cone steel roof. Immediate delivery. Prompt erection. Atlas Tank & Steel Co., Box 2297, Tulsa 1, Okla.

FOR SALE: In Oklahoma three single Reduction Gear Units, one Type 50 Lufkin, one National H-60 and one National H-6. Cities Service Oil Co., Patridge, Bartlesville, Okla.

WAUKESHA GKU-195 and four 1" Gould Two-Stage Centrifugal Pumps for Light Hydrocarbon Service. This equipment used only four months. P. O. Box 2291 or phone 5-6640, Tulsa.

WE OFFER: Two casing pulling units—Hydraulic operated—in A-1 condition—together with two pickup trucks 1950 and 1952 models and two heavy metal tool houses and one circulating unit. Pipe Pulling, Inc., Stafford, Kansas.

TANK CARS FOR SALE

8,000 and 10,000 gal. capacity, all coiled, some insulated. Delivery prompt or later. Now in service.

P.O. Box A, Lyons, Illinois

FOR SALE

11—New 24D120-2 Homelite 2500 watt 120V DC Portable Gasoline Generators, each **$390.00**

1—New 24A230/180 Homelite 2500 watt 230V 180 cycle 3 phase AC-110V D.C. Portable Gasoline Generator **$420.00**

1—Used (less than 20 hours) 25A230/180 Homelite 4500 watt 230V 180 cycle 3 phase AC-110V D.C. Portable Gasoline Generator **$500.00**

Box 3156, Whittier Station, Tulsa, Okla.

EQUIPMENT FOR SALE

NEW LEE C. MOORE 100' Cantilever Mast for sale. 18' x 40' 9" base. 510,000#. Herman Graham Drilling Co., Salem, Ill.

USED ROTARY, cable tools, and production equipment. E. A. Kelly, 3131 S.E. 29th Street, P. O. Box 861, Oklahoma City. Phone Jackson 56407.

1000'—14" OD x 119 lbs. per ft. x 20' random length, H. R. seamless steel tubing. Box G-562, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1 Farrel-Birmingham Type SI-148 Speed Increaser, right-hand assembly, Top Spray, 300 HP, 900 to 3623 RPM, 4.025 1 Ratio, Cooler and Pump Assembly—New. Price $3,000 f.o.b. Oklahoma City. Address inquiry George Gentry, Room 546 Adams Building, Phillips Petroleum Company, Bartlesville, Oklahoma.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

5—55,000 bbl., 1—25,000 bbl., 10—10,000 bbl., 4—5,000 bbl. tanks, all standard specifications, all steel roofs, all bottoms thoroughly cleaned, located Wichita, Kansas, sell standing or cut down, loaded on cars.

50,000 ft—6⅝" OD, Schedule 40, seamless, 18.97 weight line pipe, cleaned, beveled and primed, 80% Range 2, 20% Range 1, guaranteed same as new every respect, located Cleveland, Oklahoma.

Ph. 3-6141 W. C. BERRY Box 1858 Tulsa

FOR SALE
DIESELS AND PUMPS

Two new 1947 unused 475 BHP 5 cylinder Baldwin Model VG Diesel Engines, each connected to Worthington Horizontal Triplex Double Acting Pump, both units with Falk Couplings and other accessories. Location Ohio, immediate delivery. Direct inquiries to

THE BUCKEYE PIPE LINE CO.
Joseph Steele, Purchasing Agent
Room 2200, 30 Broad St.
New York 4, N. Y.

FOR SALE

Complete National 100 Rig including 3 PTD-6 Superior Diesel Engines with dual fuel equipment, 136' Lee C. Moore Mast with 8' substructure, 2 C-350 Ideal Power Pumps, Ideal Type 548 TC Traveling Block, Type R3 Swivel, and Type MS-20½ Rotary Table. Excellent condition, priced reasonable, located in Montana. Complete inventory upon request.

Box G-341

The Oil and Gas Journal,
Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: 1 Wilson Atlas Draw Works, Serial #6245. 2 G.A.K. Waukesha engines, completely overhauled with all new parts. A-1 condition. Makin Drilling Company, Box No. 1628, Phone 3-3141, Hobbs, New Mexico.

N-4 BREWSTER rotary drilling rig, 12" Gardner-Denver pump w/ NKU Waukesha engine, Lee C. Moore mast, 51½' Substructure, 5800' of 3½" Ext. upset int. flush drill pipe. All purchased new. Has been in use 12 mos. A-1 condition. Write Box 4657, Oklahoma City, or Pho. ME 4-1413.

JOY 300 Drilling Rig butane powered, mounted on Brockaway 6x6 truck, 3500 feet 3½ inch drill pipe. Auxiliary mud pump and butane engine as separate unit. All tools and equipment included. This rig in first-class working condition and ready to go to work immediately. Call or write Steele Brothers, Crete, Nebraska. Phone 127.

3—100 KVA 6900/460/230/115 volt 60 cy. Westinghouse Type SK Style #488595 oil transformers—standard accessories. Condition A-1, electrically like new. $699.00 each FOB K.C., Mo. Brundred Oil Corp., 208 Nichols Rd., Kansas City, Mo.—Westport 1866.

HYDRAULIC Casing Pulling Machine. This rig has been used only two (2) months, and is very attractively priced. Contact C. E. Knight, Box 1688, Snyder, Texas. Ph. 3-6646.

FOR SALE: Type 80 Cooper gas compressor. Good condition. Alfred B. Kern, 223 Wright Building, Tulsa, Oklahoma.

D-13000 and D-17000 Caterpillar engines skid mounted for driving piston pumps or centrifugal pumps. Located in southern Illinois. Priced for fast sale. Sohio Pipe Line Company, 407 N. 8th St., St. Louis, Mo.

FOR SALE: 60,000 4½ o.d. s.s. line, 60,000 3½ o.d. line all new. 5—55,000 bbl. tanks. 5—10,000 and 5—5,000 tanks. Lundquist Pipe & Supply Co. Phone 5-8850, Tulsa, Okla. P. O. Box 1215.

FOR SALE: 10,000'—4½" drill pipe, with tool joints cut off, located at Hobbs, New Mexico. Makin Drilling Company, Box 1628, Hobbs, New Mexico.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

PUMP FOR SALE

Nearly new 5" Blackmer with S. K. Filter, V-Belt driven.

P.O. Box A, Lyons, Illinois

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE

New and Used material—Immediate delivery from stock, Angles, Channels, I and WF Beams, especially for construction needs.

H BEAMS **PILE SECTIONS**

Phone or Wire your steel requirements.

We are also interested in purchasing your surplus material. We assure you our prices will be the best obtainable.

CARSAND STEEL CORP.
14-23 34th Avenue
Astoria, New York
Astoria 8-4484 8-8023

EQUIPMENT WANTED

—WANTED: Three used 12 cylinder RXIVW LeRoi engines, in good condition, at a bargain. Makin Drilling Company, P.O. Box 1628, Hobbs, New Mexico. Phone 3-3141.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

NOTICE: We buy. We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

WANTED TO BUY: Good used cable tool rig capable drilling 3500'—6" hole. Give full details, price and location first letter. Box 221, Vernal, Utah.

WANTED TO BUY: Used Proportioneers blending equipment or other asphalt blending equipment. The Somerset Refinery, Box 631, Somerset, Kentucky.

HELP WANTED

WANTED: Experienced Safety Engineer for oilwell drilling contractor, with nine (9) rotary rigs operating in West Texas and Southeast New Mexico area. In applying, give age, references, and experience. Reply Box G-496, The Oil and Gas Journal, Tulsa, Oklahoma.

A FIRST-CLASS Instrument Man capable of servicing the latest type of instruments on Catalytic Cracking and general refinery processes. Give complete brief of experience and personal data in letter. Delta Refining Company, located at Memphis, Tenn.

MANUFACTURER'S AGENT
to represent manufacturer of oil-field drilling equipment in the West Texas territory. Write Box G-548, The Oil and Gas Journal, Tulsa, Oklahoma.

District Sales Representatives for nationally known well logging company. Attractive drawing account and commission. Permanent locations in Dallas, Fort Worth, Houston, and Billings. Inquiries held strictly confidential. Our employees know of this ad. Box G-554, The Oil and Gas Journal, Tulsa, Oklahoma.

PROCESS ENGINEERS

Engineering contractor has openings which offer excellent opportunities for young Process Engineers with background in chemical, refining, or gas & gasoline industries, for permanent position in office located in Tulsa, Oklahoma. One to five years experience is desirable but college education & willingness to assume responsibility are essential. Applicants should write giving age, resume of experience, education and salary expected. Please address Box G-519, The Oil and Gas Journal, Tulsa, Oklahoma.

LARGE INDEPENDENT OIL CORPORATION

. . . has openings for three junior engineers who are interested in refining operations. Location of employment will be in large central Oklahoma refinery in a new technical service that is being developed.

These positions involve technical service work in crude distillation; catalytic cracking; gas recovery; polymerization; H-F Alkylation; and delayed coking.

Applicants must be refining, mechanical, or chemical engineering graduates. These are permanent positions with a young, progressive company and offer excellent opportunity for experience and for advancement in an expanding organization. Give details of experience and salary expected.

Box G-567, The Oil and Gas Journal,
Tulsa, Oklahoma

HELP WANTED

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

CHEMICAL ENGINEER
or
CHEMIST

Major Oil Company operating in Venezuela has opening in Production laboratory for Chemical Engineer or Chemist with experience in operation of Podbielniak Column; preferably low temperature Hyd-Robot type. . . .

Experience in operation P.V.T. equipment desirable but not essential.

P. O. BOX #35
Bowling Green Station
New York 4, N. Y.

PETROLEUM ENGINEERS

FOREIGN SERVICE

Graduate engineers with good background in general physics, mathematics, mechanics and with some laboratory experience in equipment and techniques. For laboratory position responsible for theoretical experimental studies on reservoir fluid and rocks. Duties will consist of designing equipment, performing or supervising testing and analyzing and reporting results. Studies pertinent to evaluation of primary depletion practices and applicability of secondary recovery for pressure maintenance operation will be required.

Please write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OG-5
Arabian-American Oil Company
505 Park Avenue
New York 22, N. Y.

WANTED

CHIEF GEOLOGIST

for

Aggressive Independent Oil Company

Operating in Rocky Mountain Area, Mid-Continent, North and West Texas.
Experience in these areas desirable. Give complete details of education and experience by letter in duplicate. All replies held confidential.

Box G-460
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

SALES ENGINEER: Familiar with design and sale of gas process equipment—gasoline plants. Box G-549, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES MANAGER wanted for drilling equipment. Applicants should have field experience. Knowledge of diesel engines desirable. Apply stating age, experience, and salary required to personnel manager, Box G-539, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURER'S AGENT
to represent manufacturer of oil-field drilling equipment in the Louisiana-Mississippi territory. Write Box G-547, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co Box 2603, Tulsa, Okla. $5.00 cash.

DESIGN ENGINEER: Mechanical Design Engineer with 5 to 8 years experience in design of drilling equipment — specifically draw works, rotary tables, and masts. Progressive expanding company, excellent working conditions and benefits. Salary commensurate with experience. REYNOLDS METALS COMPANY, 2000 S. Ninth Street, Louisville, Kentucky.

CONTINENTAL Oil Company has several openings for Petroleum Production Engineers in the Rocky Mountain Region. Minimum 3 years' experience required. Also have opening for Mechanical Engineer with oil field experience. Apply to C. C. Frye, Regional Petroleum Engineer, Denver, Colorado.

REFINERY Engineer for small independent company, 30-40 years of age, Project Estimating, Design, Drafting. Give detailed experience and salary expected. Box G-536, The Oil and Gas Journal, Tulsa, Oklahoma.

MALE TECHNICAL graduate wanted for gasoline testing laboratory in Tulsa, Oklahoma. Forty-hour week with excellent working conditions and liberal employee benefit plans. State experience and salary expectation. Box G-566, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: District Superintendent, by aggressive, active and sizable independent oil company. Applicant must be thoroughly experienced in production and well completions. Engineering background and age under 40 desirable. Residence will be in Oklahoma City. This job of opportunity and security carries a good salary, plus other incentives. In letter of application, give **complete** destails. All replies held in strict confidence. Box G-563, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Petroleum or Mechanical Engineers for oil tool design. Field experience desirable. State age, education, experience and salary expected. Box G-556, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

PRODUCTION SUPERINTENDENT
CHIEF PETROLEUM ENGINEER
EQUIPMENT ENGINEER
RESERVOIR ENGINEER
DRILLING ENGINEER
PRODUCTION FOREMAN
GASOLINE PROCESS ENGINEER
ASSISTANT CHIEF GEOLOGIST
SURFACE GEOLOGIST
SUBSURFACE GEOLOGIST
EXPLOITATION GEOLOGIST

For work on DeMares Concession, Colombia, South America. Excellent salary plus substantial income tax savings. Good living conditions. Two year contract. Annual local vacation and paid vacation to United States if contract renewed. Give details of age, education and experience by letter. All replies held confidential. Reply to Box G-516, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

LANDMAN, five years land and title experience; LLB and BBA degrees; 34 years of age; references furnished. Box G-508, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 1628, Ph. No. 3-3141, Hobbs, New Mexico.

CHEMICAL ENGINEER, twelve years in refining and petrochemicals is interested in manufacturer's representationship or private venture in Corpus Christi area. Box G-544, The Oil and Gas Journal, Tulsa, Oklahoma.

CORROSION ENGINEER wants promotion. More than ten years experience with major company in Corrosion Control on bare and coated pipe lines. Registered Engineer, Supervisory experience. Capable of organizing and directing a program of Corrosion Control. Box G-543, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST 8 years experience in oil exploration including interpretation, administration, and geological coordination work. Presently employed directing varied geophysical program in South America. Desires responsible position in oil exploration work in eastern USA. Box G-511, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST available soon, 9 years experience, age 35. Prefer Tulsa or Midland location. Box G-564, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC PARTY CHIEF: 5 years experience, B.S. degree in Geophysics. Desires responsible position in oil exploration. Excellent references. Box G-565, The Oil and Gas Journal, Tulsa, Oklahoma.

CONTROLLER, Treasurer, Office Manager, Department Head desires responsible supervisory or administrative position with oil or gas company or service organization. 25 years extensive, diversified experience, domestic and foreign, with major oil companies, including producing, refining and marketing. Accounting and tax background. Widely traveled; speaks Spanish and French. Mature, poised and used to responsibilities. Presently employed in managerial capacity. Highest references. Middle forties; married. Will re-locate. Box G-561, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY ENGINEER experienced in design, construction, and maintenance supervision of fluid and thermofor cat crackers, pipe stills and product treating. Desire relocation. Age 29. Box G-478, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPING DESIGNER, with 15 years diversified refinery & petrochemical plant design experience. Have supervisory background for drawing room or project engineering assignments. Box G-560, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER: Age 24, married. B.S. in E.E. 30 hours on M.S. I.E. One year experience. Prefer Mid-Continent or Southwest. Box G-559, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: 8½ years diversified experience in refinery operations and process design with major. Desire position with small independent or engineering firm in South Texas area. Box G-555, The Oil and Gas Journal, Tulsa, Oklahoma.

MICROWAVE ENGINEER graduate with FCC operator's license and five years experience in V.H.F.—microwave communications field desires position with pipe line company. Experience includes sit surveys, FCC licensing, system design and field installations, one for a large pipe line. Box G-557, The Oil and Gas Journal, Tulsa, Oklahoma.

Young Executive, thirteen years diversified experience in the Petroleum Industry, with completely integrated independent companies as Chief Accountant, Office Manager, District Manager, and General Manager. Thoroughly familiar with Finance and Organization. Will be available after July 1. Desires a position with a future. Not afraid of work or responsibilities. Box G-535, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

EXECUTIVE: Division Superintendent in charge of drilling and production for large operator in West Texas. Twenty years diversified experience in field operations and management. Available September 1st. Box G-558, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

SEE A. L. Bowles, Rollow Building, Ada, Oklahoma, for drilling deals.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

CENTRAL KANSAS drilling deals, will farm out or sell interest and drill myself, 1,000 to 4,000 feet. Lewis Short, Burrton, Kansas.

300 ACRES — Ohio-Indiana line, 6 wells, 1200 ft., good gas-oil potential if reworked. New locations. Price, 55 Virginia Ave., Indianapolis, Indiana.

BLOCK of leases in Kay County, Oklahoma, near producing wells, for drilling operations. Full particulars write George Jacques, Uncas, Okla.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6835 De'mar Ave., St. Louis 5, Mo.

ELECTRICAL CONTRACTORS

Office Phone	Res. Phone
5-5315	7-4950

W. L. RATCLIFF COMPANY
ELECTRICAL CONTRACTORS
Industrial—Commercial—Distribution

W. L. Ratcliff	506 Caddo St.
P. O. Box 373	Shreveport, La.

REAL ESTATE

155 ACRES on promising structure producing oil and gas wells within ½ mile on north and west new wells being drilled on north. John Harlow, Louisburg, Kansas.

FOR LEASE: Attractive, conveniently arranged brick office building, 80' x 34', in downtown Odessa, Texas. Excellent office space for oil company, independent oil operators, equipment company or drilling contractors. For information write Wilson Estate, Box 485, Odessa, Texas, or Telephone 6-6242.

OFFICE BUILDING

Shreveport, La.

Approximately 15,000 square feet of floor space available at edge of downtown Shreveport. Will remodel completely for tenant on long term lease; or lease on favorable terms so tenant can improve and remodel to fit his needs.

Ideally suited for oil or gas company district office.

Write: 1313 Slattery Bldg.

SHREVEPORT, LA.

ROYALTIES

PRINCIPAL will buy $100,000.00 to $200,000.00 worth of oil (or gas) royalties that are developed. Will purchase direct from owners or through authorized broker. Prefer a group of interests in several areas. Send 1952 and 1953 income by months. Box G-552, The Oil and Gas Journal, Tulsa, Oklahoma.

IN ELK CITY FIELD, offering royalties ahead of the drill, conditional guarantee with sale, contact owner: A. S. Berry, P. O. Box 1383, Tulsa, Okla.

PRODUCING ROYALTY and overrides for sale. Wire-write-call for particulars. JACK EAGLE, 706 City Natl. Bldg., Okla. City, Okla. REgent 6-7027.

QUICK CASH: Producing royalties, Overrides or Production . . . no delay. Phone 72-4533, Robert L. Kinkaid . . . P.O. Box 26, Tulsa, Oklahoma.

WE WILL BUY

Producing royalties overriding royalties and production, any amount. Submit complete detail information. Confidential.

COMBEST ROYALTY COMPANY
Amarillo Building, Amarillo, Texas

ROYALTIES WANTED
Producing Royalties
High Grade Only
Send Full Particulars
Address

C. C. HARMON
719 World Bldg., Tulsa, Okla.
P.O. Box 2151

BUSINESS OPPORTUNITIES

HAVE 200 SHARES Tex Harvey Employee Inc. stock for sale. $3.00 share. Will furnish complete information upon request. J. D. Burke, Box 3742, Telephone 2-2986, Odessa, Texas.

ESTABLISHING oil-gas publication to serve rich region. Want silent partner, investing $5,000. Excellent deal. P.O. Box 973, Houston, Tex.

NEED financial help to develop lease. Excellent geology. Semi-wildcat. High gravity oil. Will sell substantial interest, or will farm out. 480 acres. P.O. Box 551, Breckenridge, Texas.

RESORTS

MOUNTAIN GUEST RANCH

Crossbow Ranch in Beartooth wilderness area east of Yellowstone Park may be reserved for your private use. Modern cabins, meals, horses and complete staff provided to insure your comfort and pleasure. Excellent trout fishing in streams and lakes, riding, cool mountain air. Ranch Office: Box 1696, Billings, Montana. Phone 9-7553.

PRODUCTION WANTED

WANT TO BUY

From Principal Owners Only
At Least 1,000 Bbls. Per Day of
Settled Production
Cash Deal Preferred

Box G-531, The Oil and Gas Journal, Tulsa, Oklahoma

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that a total of approximately 954.51 acres of acquired lands will be offered in three separate parcels for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 p.m. Eastern Standard Time, on July 22, 1953, when bids will be opened. Details of the lease offering, how and where to submit bids, and a copy of the lease form may be obtained upon request from the Oil and Gas Supervisor, U.S. Geological Survey, Roswell, New Mexico, or from the Washington Office of the Bureau of Land Management, Washington 25, D.C. Edward T. Woozley, Administrator.

EQUIPMENT MEN

National Aluminate Names McGrew Technical Director

E. H. McGREW

E. H. McGrew, formerly of Universal Oil Products Co., has been named new technical director of catalyst division of National Aluminate Corp. McGrew will be located at the Nalcat Chicago plant, and will assume direction of many technical matters as assistant to Dr. D. G. Braithwaite, assistant vice president of Nalco.

A chemical engineering graduate of University of Nebraska, McGrew has been connected with the petroleum industry for more than 25 years. Since 1939 he has been actively involved in both development and operation of catalytic cracking processes.

Graver Tank Names Behmer District Sales Manager

W. C. BEHMER

W. M. Broxham, vice president in charge of sales, Graver Tank & Manufacturing Co., Inc., East Chicago, Ind., has announced the recent promotion of William C. Behmer to district sales manager, Chicago.

Behmer has spent more than 15 years with Graver's sales department, joining the company in 1937. He was headquartered at Graver's plant in East Chicago until 1946, at which time he was transferred to the company's office in Chicago. In 1951 he was named assistant sales manager for the Chicago district.

General American Appoints Rollins Western Manager

Edward D. Rollins has been appointed western manager of General American Transportation Corp.'s new plate and welding division sales office in San Francisco, it was announced recently by H. D. Skyrm, vice president of the company.

The San Francisco office has been opened to serve potential clients for General American's new steel fabricating plant now nearing completion at Orem, Utah, which will service the West Coast and Rocky Mountain areas.

Rollins is taking over his new post after 8 years' service with General American in the Chicago area.

Ervin Made Vice President, Director of American Chain

HENRY ERVIN

H. WILLIAMS

Henry Ervin has been elected vice president-director of sales of American Chain & Cable Co., Inc., and associate companies. Sales activities of 16 divisions of the company will be under his direction from headquarters at New York.

Harry Williams has also been elected a vice president of the company with headquarters in the Detroit office.

Ervin has been with American Chain since 1937, and for the past 2 years has been administer, general sales. Prior to that he was district manager for American Chain division in the New York district.

Williams joined the company in 1927 and has been sales manager of the automotive and aircraft division in Detroit. He will continue to supervise sales activities of that division.

Linde Pump to Manufacture Pacific Centrifugal Pumps

Elmer J. Weis, vice president and sales manager of Pacific Pumps, Inc., Huntington Park, Calif., recently announced the signing of an agreement with Hugh Harper, president of The Linde Pump & Engineering Co., Ltd., Montreal, Que., for the manufacture, sales and servicing of Pacific custom-built centrifugal pumps in Canada. The pumps will be marketed under the trade name of "Linde-Pacific."

According to Harper, the company will operate Linde-Pacific sales and service offices in Toronto, Winnipeg, Vancouver, as well as from the home office at Montreal.

The Linde Canadian Refrigeration

Co., Ltd., with main offices at the same Montreal address is another Linde affiliate.

Consolidated Engineering Announces Three Promotions

Promotion of three key executives of Consolidated Engineering Corp., Pasadena, Calif., by the company's board of directors, was announced recently by Philip S. Fogg, president.

Hugh F. Colvin was elevated to the position of vice president and general manager of the corporation. Robert L. Smallman was elected to the office of vice president in charge of sales, and Victor Pollock was chosen as treasurer.

Colvin joined Consolidated in 1947 as treasurer and assistant to the president. A graduate of California Institute of Technology and Harvard School of Business Administration, Colvin served with American Gas Association, Wilshire Oil Co., and Union Oil Co. of California, prior to joining Consolidated.

Smallman, formerly director of sales for the company's electromechanical instrument division, joined the firm in 1947, coming from General Electric Corp. He is a 1933 graduate of California Institute of Technology. As vice president in charge of sales, Smallman will direct operations of both sales divisions of the instrument firm, with offices in Chicago, New York, Philadelphia, Washington, D. C., Dayton, and Dallas.

Pollock joined Consolidated in May 1952 as assistant to the treasurer following an 11-year association with W. R. Grace & Co.

Conklin, Campbell Named to New Sales Posts by du Pont

David H. Conklin has been named by E. I. du Pont de Nemours & Co., Inc., to succeed Ray E. Miller as director of sales of the petroleum-chemicals division of the company. Miller will continue in this division as advisor to Conklin.

D. H. CONKLIN

M. H. CAMPBELL

Milton H. Campbell, head of the petroleum-research division of Jackson Laboratory, Deepwater Point, N. J., will succeed Conklin as assistant director of sales.

Conklin joined Ingersoll-Rand in 1935, handling sales, service, and installation of industrial and oil-field equipment in the company's Los Angeles district. In 1947 he joined du Pont, and shortly after became West Coast district manager for petroleum-chemicals division, with headquarters in Los Angeles. Two years later he was transferred to Wilmington, Del., as assistant sales manager of the division. In 1951 he was named assistant director of sales.

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South Louisiana

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gravity oil per day through 10/64-in. choke from casing perforations at 8,280-8,310 ft. This is second well for field.

Bayou Couba—Gulf Refining Co. 65 Delta, completed flowing 18 bbl. of 44.7°-gravity condensate with 1,574,000 cu. ft. of gas per day through 12/64-in. choke from casing perforations at 8,284-8,334 ft.

NORTH LOUISIANA

New Wilcox Strike Finaled In Grant

Grant Parish in central Louisiana has a new Wilcox oil discovery 1 mile northwest of Aloha in the western part of the parish. The new strike and pool opener is Bates & Cornell 1 Walter Fletcher, C SW NW SE 9-7n-4w. The well is producing from perforations at 4,290-4,300 ft. in the shaly sand body of the lower half of the Wilcox. The discovery is flowing 56 bbl. of oil per day through 6/64-in. choke.

Potential Taken at Willow Chute Strike

Absolute open flow is 4,000 M.c.f. of gas per day from the Bodcaw sand at 8,316-30 ft. at Pan American Production Co. 1 Hunt in Section 5-19n-13w. The Willow Chute pool discovery well is located in western Bossier Parish near Benton field. The well flowed 21.5 bbl. of condensate and 2,976 M.c.f. of gas per day through 16/64-in. choke.

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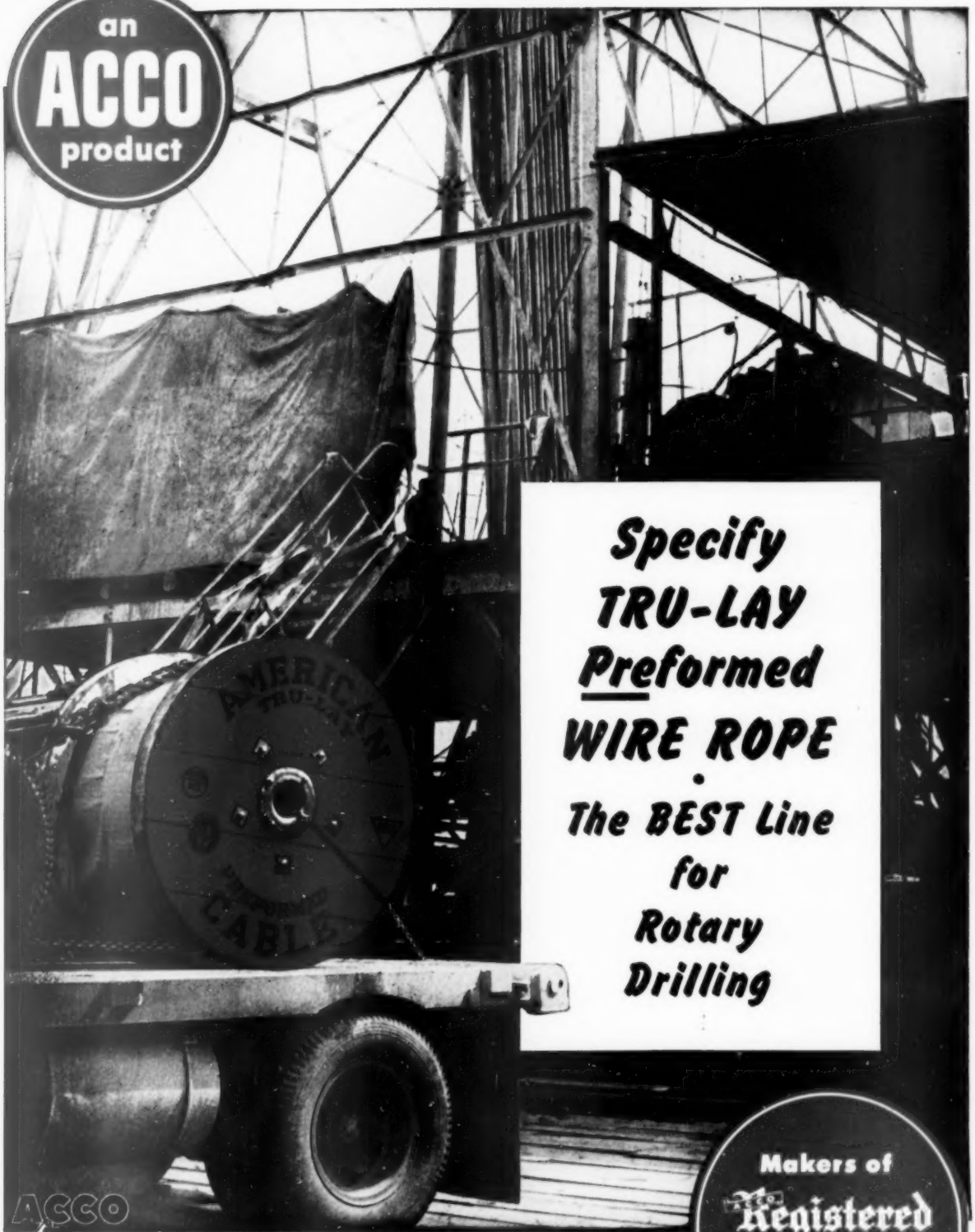

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